

**TASK 1  
FIELD CONSTRUCTION PLAN  
FOR  
RICHARDSON FLAT TAILINGS SITE**

**EPA SITE ID: UT980952840**

**April 22, 2008**

**Prepared for:**

**United Park City Mines  
P.O. Box 1450  
Park City, UT 84060**

**Prepared by:**

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8138 South State Street, Suite 2A  
Midvale, Utah 84047**

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960 MS  
888-917-8048  
59513

1080  
2196  
\$1048.93

Sediments  
Remediation Goal  
Cuttlands 310 ppm Pb  
Soils  
500 ppm

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Park City, UT 84060**

**Prepared by: \_\_\_\_\_**  
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Resource Management Consultants

**Date:**

**Reviewed by: \_\_\_\_\_**  
Kerry Gee  
United Park City Mines Company

**Date:**

**Reviewed by: \_\_\_\_\_**  
Kathryn Hernandez  
USEPA Remedial Project Manager

**Date:**

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## **1.0 INTRODUCTION**

This Field Construction Plan (FCP) details the construction components, stormwater management and procedures and completion milestones to be undertaken for the construction of Task 1 of the Remedial Design and Remedial Action at Richardson Flat. Task 1 areas are presented in Figure 1-1. The tasks are required to complete the selected remedy approved by the United States Environmental Protection Agency (EPA) at the Richardson Flat Tailings Site, Site ID UT980952840, (The "Site") near Park City, Utah.

A full description of Site background, investigative history, specifications, health and safety, design elements, project management and construction procedures are presented in the Remedial Design and Remedial Action Work Plan (RD/RA, RMC 2007a). This FCP is intended to act as a planning supplement to the RD/RA with a focus on stormwater runoff protection and actual remediation related construction to take place in the field.

Work to be performed in Task 1:

- 1) Construction of the Wedge Buttress; and
- 2) Cover placement, grading, confirmation sampling, erosion control structure placement and revegetation in areas F-1 (immediately behind the main embankment) and F-7 (area where the Park and Ride is located) (Figure 1-1).

### **1.1 Remedy Description and Overview**

The remedy is specified in the Record of Decision (ROD) and detailed in the RD/RA.

The selected remedial alternative contains the following elements related to Task 1 areas:

- Placing excavated materials within Task 1 areas inside the impoundment. The area within the impoundment will be used by United Park City Mines Company (United Park) and others to accommodate similar Bevill-exempt mine waste from the upper Silver Creek watershed;



- Placement of a minimum twelve inches of low permeability soil cover on areas where contaminated fill has been placed to the desired thickness and where tailings are left in-place. This includes areas within the impoundment where contaminated fill from other areas may not be placed. The cover will be machine compacted. Upon completion of the low permeability soil cover, a six-inch topsoil cover will be placed. The final surface cover will be a minimum of eighteen inches thick and the surface will be graded to control surface stormwater runoff and drainage;
- Installation of a rock wedge buttress along the oversteepened portion of the embankment for about 400 feet of the total embankment length of 800 feet;
- Regrading and revegetation of areas affected by remediation at the Site. Areas in which tailings are removed will be restored, where possible, to pre-tailings topographic conditions;
- Monitoring Site conditions (vegetation and erosion) on a bi-annual basis for two to five years after remediation is complete at the site, or until three inspections pass with no maintenance work required;
- The area for the Park and Ride will be graded and paved. Stormwater runoff may contain roadway salt. For this reason none of the runoff from the parking lot will be allowed to flow into the South Diversion Ditch. This stormwater runoff along with that from the access roadway will be collected in closed basins designed to handle the total flow without discharge into the diversion ditch; and
- The construction work for the Park and Ride will include buried electrical conduits and future utility corridors for water and sewer and an overhead power line leading to the Park and Ride from the main power line located north of the impoundment. These utilities are anticipated but not in any near-range plans. All electric lights are to be solar or other alternative power source. However, if efficient solar lighting cannot be obtained, another option for lighting would be to use a solar array or wind powered generators for power generation back into the electrical grid for credits. The credits would be used to power the lights at night. Buying wind power is also an alternative.

## **2.0 WORK PROCEDURES**

Work will be conducted according to specifications presented in Section 6.0 of the RD/RA.

### **2.1 Wedge Buttress**

The wedge buttress will be designed to provide additional stability to the current embankment. The buttress design is based on an embankment stability study performed by Applied Geotechnical Engineering Consultants, Inc. (AGEC, 2001) and presented in Appendix D of the RD/RA. Work procedures for wedge buttress construction will include:

- 1) Clear and grub the footprint of the wedge buttress of all vegetation and unstable materials;
- 2) Abandon the monitoring wells along the embankment. An attempt should be made to either pull casing or drill it out and plug with a cement/grout mixture as these wells could be a source of water seepage under the wedge;
- 3) Slope the base of the buttress towards the wetland at a five-percent slope;
- 4) The initial base layer of the buttress will be keyed into the natural soils approximately twelve-inches below the toe of the tailings embankment;
- 5) Material comprising the initial base layer will consist of well-graded rock with no soil. This layer will be placed twelve inches deep along the entire width and length of the wedge buttress. Size of this material will be three-inch minus and well graded. The volume for the base layer is approximately 385 cyds; and

- 6) Overlying the base layer will be approximately 6,385 cyds of four to six inch rock.

The embankment wedge buttress design and construction details are presented in Figure 2-1. The wedge buttress location is presented in Figure 1-1.

## **2.2 F-1 and F-7**

Work activities in area F-1 (Figure 1-1) will consist of the placement of contaminated materials from offsite and grading of low permeability cover soil and top soil as specified in Section 6.0 of the RD/RA. The area will be revegetated after placement of the soil cover is complete. Area F-7 is the site for a proposed recreational facility and Park and Ride lot. The area will be covered with clean soils as described elsewhere in this report to comply with the requirements of the RD/RA Work plan. Following compliance with these requirements, the area in F-7 will be graded to an elevation that will allow the construction of the Park and Ride facility. A separate set of documents that detail the specific design elements of the Park and Ride is included as Appendix A. It includes only the Park and Ride facility. It will not include the future recreational ball fields.

A separate plan for these fields will be submitted prior to construction to understand their affect if any on the remedy for Richardson Flat.

- 1) If needed, excavation and construction areas will be cleared and grubbed prior to the placement of materials. Clearing and grubbing will include the removal of organic matter such as plants, trees and woody material, as well as any other material from the Site. Large non-organic materials such as boulders that interfere with grading will be removed from the areas as required.
- 2) Appropriate dust control will be conducted during all construction activities.

- 3) If additional mine waste material is placed, the material will be placed and graded to conform to general site topography prior to the placement of cover soils. It will be machine compacted.
- 4) Surfaces and subgrades will be graded to approximate final configurations and shapes prior to cover and topsoil placement. Subgrades and final graded surfaces will be confirmed by conventional survey techniques where applicable. Dust control will be conducted during grading activities.
- 5) Imported soils used in the covering process will be screened with the XRF. In addition a five sub-sample composite will be collected for every 5,000 cyds and submitted to the laboratory for lead and arsenic analysis. All cover and topsoil will contain less than 500 ppm lead and 100 ppm arsenic. Sampling protocol and analytical methodologies are described in the Field Sampling Plan (FSP, RMC, 2007b).
- 6) Cover soils will be low permeability, high clay content soils typical of those found in the region, large rock material will be avoided. Clay rich soils located on-site will be used as cover material using the same criteria outlined in Section 6.1 of the RD/RA for quality control.
- 7) Cover soils will be compacted with tracked or equivalent equipment. Compaction methods also may include rolling and/or vibrating, as necessary. Cover soils will be inspected and approved by United Park or its representatives prior to topsoil placement.
- 8) Air monitoring will be conducted during earthmoving activities. If required, additional air monitoring locations and/or additional BMPs will be established to reduce the offsite migration of contaminants. Air monitoring will be conducted according to procedures outlined in Section 11.1.1 of the RD/RA and Section 4.4.5 of the FSP.

350 ppm  
Pb -

- 9) The final cover subgrade surface will be uniform to allow for the placement of a consistent topsoil layer.
- 10) Topsoil will be screened to remove particles greater than six-inches and will be suitable to support vegetation. Topsoil will be placed to a minimum depth of six-inches and will contain sufficient organic matter and nutrients to ensure that revegetation efforts are successful.
- 11) The seedbed will consist of topsoil placed during remedial activities. Topsoil will be lightly compacted and scarified as necessary. The seedbed will be roughened prior to seeding. Wood chips composted with cow manure may be used where needed to enhance the growth characteristics of the soil materials.
- 12) Final surfaces, grades and erosion control structures will not be considered complete until approved by United Park or its representative.
- 13) Revegetation will be conducted on all graded areas and areas receiving topsoil.

Portions of the Park and Ride area located in area F-7 will be paved (Figure 1-1). A stormwater pollution prevention plan will be prepared and executed for the Park and Ride construction to ensure that the South Diversion Ditch is adequately protected.
- 14) The seed mix will include a mixture of deep-rooted annual and perennial native grass and forb species. The annual species will provide rapid germination to aid in short term revegetation. The short-term revegetation will decrease the runoff potential of the slope and will keep the imported soil in place. The perennial species will provide longer term, more stable revegetation. Appendix C of the RD/RA contains the seed specifications for the Site.
- 15) Completion confirmation sampling is detailed in Section 4.0

### **3.0 STORMWATER MANAGEMENT**

Stormwater management will be conducted to:

- Reduce the potential for offsite migration of sediments, soil and tailings; and
- Eliminate the re-contamination of areas that have been covered or have undergone source removal.

General stormwater management elements include:

- Berms, wattle and/or silt fencing as required to prevent the migration of materials from work areas;
- Sediment barriers in the South Diversion Ditch, pond and wetland to capture sediment and prevent downstream off-site migration. These in-flow barriers may include a combination of filter fabric, drop structures and/or temporary retention structures.
- Sediment basins will be constructed on an as-needed basis;
- General grading to direct potential stormwater runoff to sediment basins and traps as needed;
- Hay or straw bale barriers will be placed in appropriate ephemeral channel features that drain from work areas. The hay bales will be placed downgradient from the silt fence or wattle barrier; and
- A supply of hay or straw bales and wattle material will be stored onsite during construction.
- Stormwater runoff protection measures will remain in-place until revegetation efforts are complete.

General procedures to reduce the tracking of contaminated materials into uncontaminated areas will include:

- All trucks and equipment working in contaminated materials (e.g. tailings and sediments) will be decontaminated prior to working with clean materials. Decontamination procedures are described in Section 11.8 of the RD/RA;

- A stabilized construction entrance will be used, if necessary, to remove gross contamination for trucks hauling tailings;
- All trucks and equipment will be decontaminated prior to leaving the site; and
- Dust control will be conducted as necessary as described in Section 11.1.1 of the RD/RA.

Specific stormwater runoff protection elements to be implemented prior to and during construction will include:

- Silt fence will be placed below the Wedge Buttress construction area. The silt fence will prevent the migration of soils into the wetland area;
- Berm and wattle (if required) on the south side of the construction zones in areas F-1 and F-7. The berm and wattle (if required) will prevent the migration of tailings and soils into the South Diversion Ditch. The work in this area consists of placing rock cover and hence, the potential for tailings migration is minimal; and
- Sediment barriers will be placed as needed at the culvert crossing and the downstream end of the South Diversion Ditch directly above the pond. This barrier will prevent the downstream migration of any sediment that has inadvertently migrated into the South Diversion Ditch and will remain in-place for the duration of the Remedial Action.

As mentioned above, a parking lot will be built on area F-7 following completion of remediation. A separate Stormwater Pollution Prevention Plan (SWPPP) will be developed to address construction and operational stormwater runoff mitigation. The Parking Lot SWPPP is presented in Appendix B. The paved areas of the parking lot will replace the final vegetative cover where applicable.

#### **4.0 COMPLETION CONFIRMATION**

Completion of work will be based upon confirmation that the following Task 1 Completion Milestones are complete:

- 1) Completion of the Wedge Buttress;
- 2) Cover Placement in areas F-1 and F-7 is complete;
- 3) Confirmation samples verify cover installation meets specifications; and
- 4) Reclamation (surface grading and drainage control) is complete.

#### **4.1 Wedge Buttress Confirmation**

For the Wedge Buttress, AGECE will prepare a letter for United Park documenting that the construction of the Wedge Buttress meets the recommendations of the 2001 embankment stability study and has achieved an adequate safety factor for the slope stability of the embankment.

#### **4.2 Cover Placement Confirmation**

Cover placement will be confirmed using two methodologies:

- 1) Imported cover soils will be screened with the XRF. A five sub-sample composite sample will be collected for every 5,000 cyds and screened with the XRF. Five-percent of the composite samples will be submitted to the laboratory for lead and arsenic analysis. All cover and topsoil will contain less than 500 ppm lead and 100 ppm arsenic. Sampling protocol and analytical methodologies are described in the Field Sampling Plan (FSP, RMC, 2007b).
- 2) Following cover placement the thickness of clean cover will be measured. If necessary, a hand coring tool will be used to measure thickness with minimal disruption to the cover. Cover thickness confirmation data will be collected on a grid located on 200-foot centers. If cover thickness is insufficient, additional sampling and cover placement will be conducted. Sampling protocol and analytical methodologies are described in the FSP (RMC, 2007b). Sample locations are presented on Figure 4.1.

*verify depth of cover*



## **5.0 DELIVERABLES**

A Task Completion Report (TCR) will be prepared. The TCR will be provided to the EPA Remedial Project Manager following the completion of the remediation task. The TCR will contain a detailed description of the work completed and will include a plans and results of any sampling efforts undertaken.

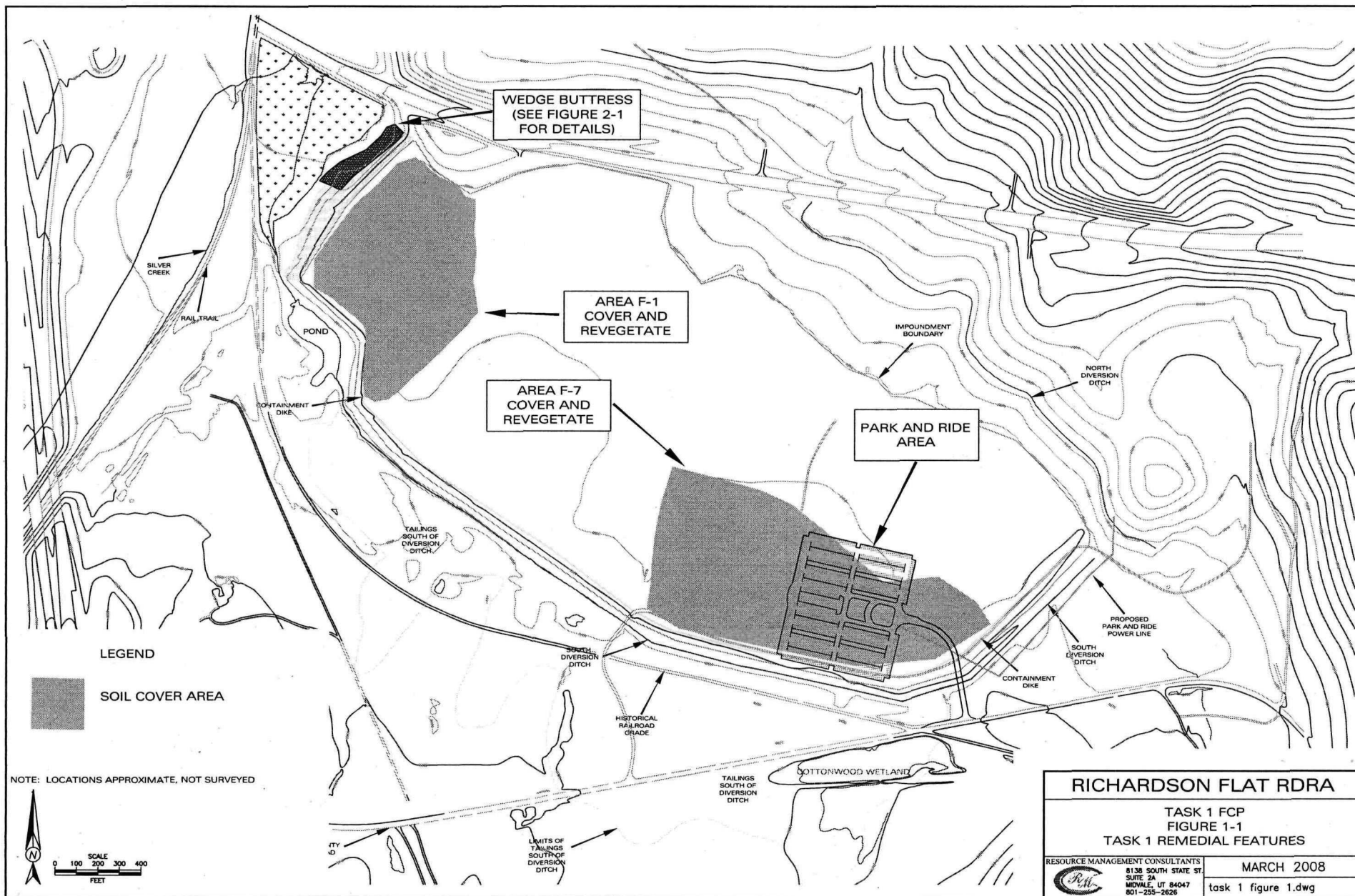
## **6.0 REFERENCES**

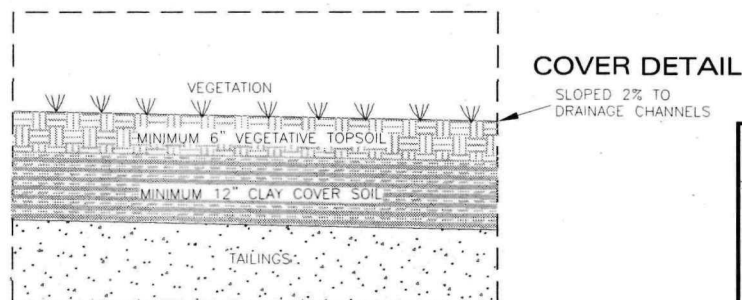
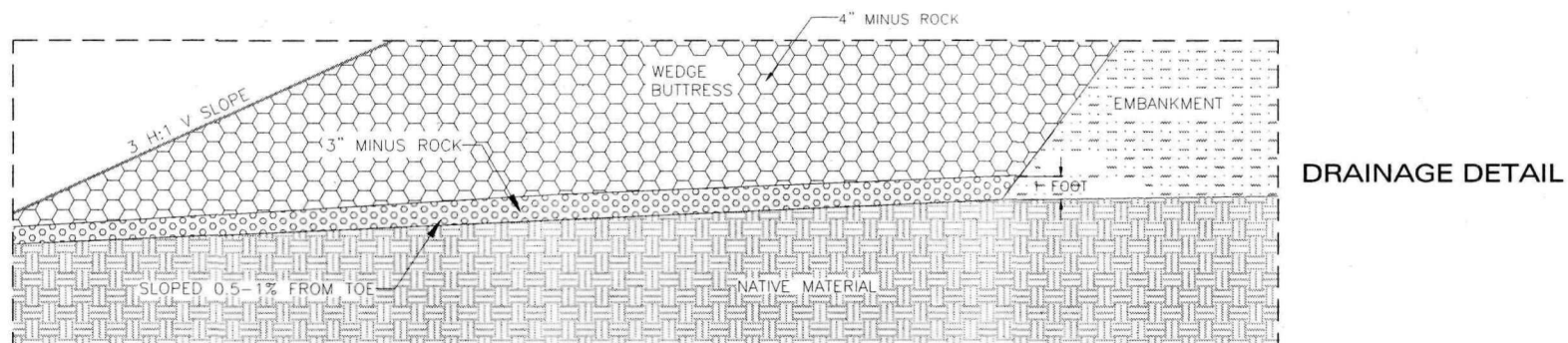
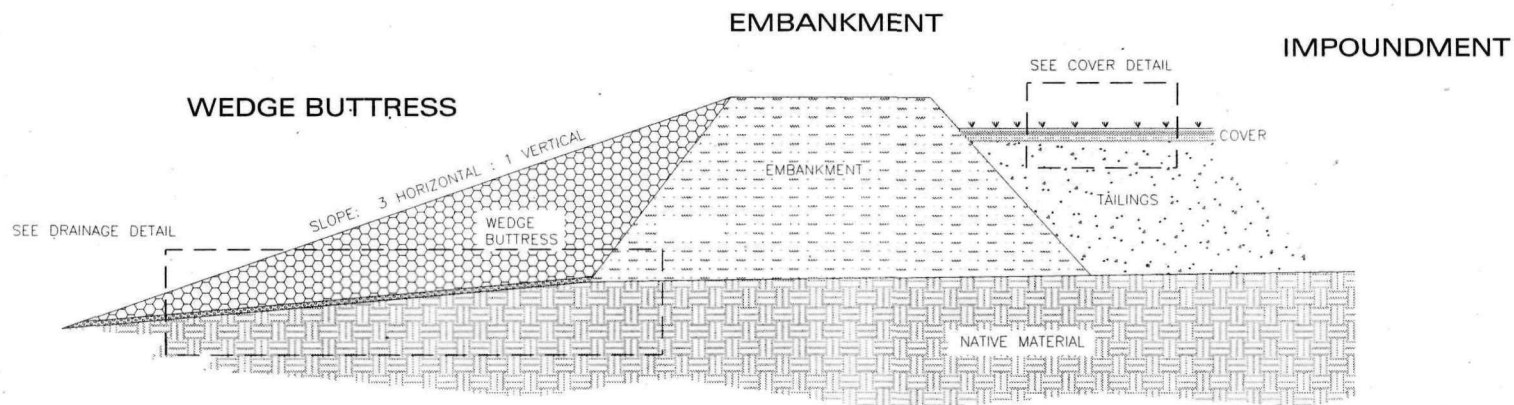
Applied Geotechnical Engineering Consultants (AGEC), 2001, Stability Evaluation - Richardson Flat Tailings Embankment.

Resource Management Consultants, Inc (RMC), 2007a, Remedial Design/Remedial Action Plan (RD/RA), Richardson Flat, Site ID Number: UT980952840, With Attached Work Plan.

Resource Management Consultants, Inc (RMC), 2007b, Field Sampling Plan, Remedial Investigation, Richardson Flat, Site ID Number: UT980952840, With Attached Work Plan.

Resource Management Consultants, Inc (RMC), 2007c, Health and Safety Policy, Remedial Investigation, Richardson Flat, Site ID Number: UT980952840, With Attached Work Plan.





NOTES:  
1. EMBANKMENT DIMENSIONS VARY.

NOT TO SCALE

## RICHARDSON FLAT RDRA

TASK 1 FCP  
FIGURE 2-1  
WEDGE BUTTRESS AND SOIL COVER  
TYPICALS

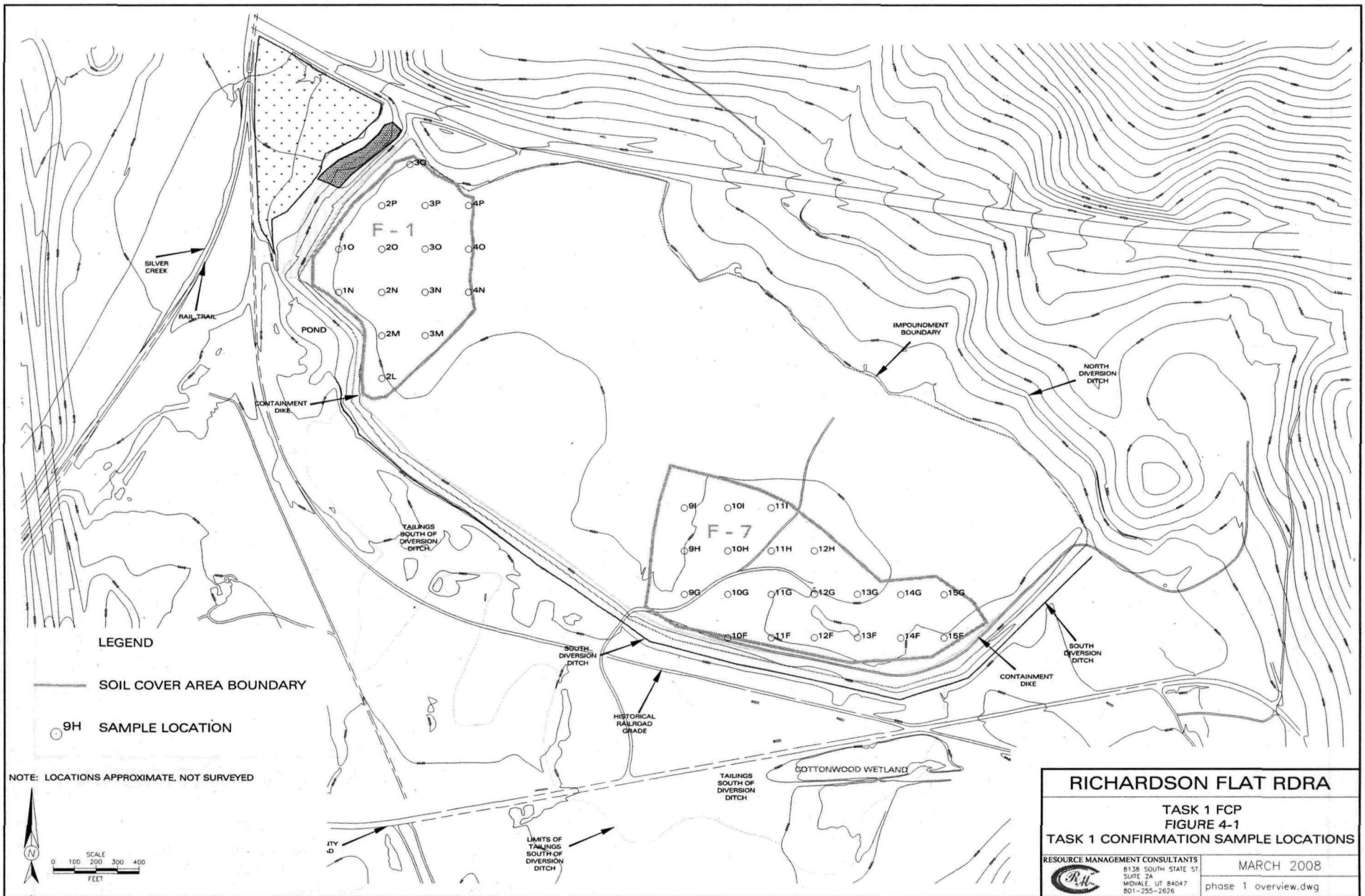
RESOURCE MANAGEMENT CONSULTANTS



8138 SOUTH STATE ST.  
SUITE 2A  
MIDVALE, UT 84047  
801-255-2626

DECEMBER 2007

rdra-tyt-design.dwg



# **Appendix A**

## **Park and Ride Lot Design Plans**

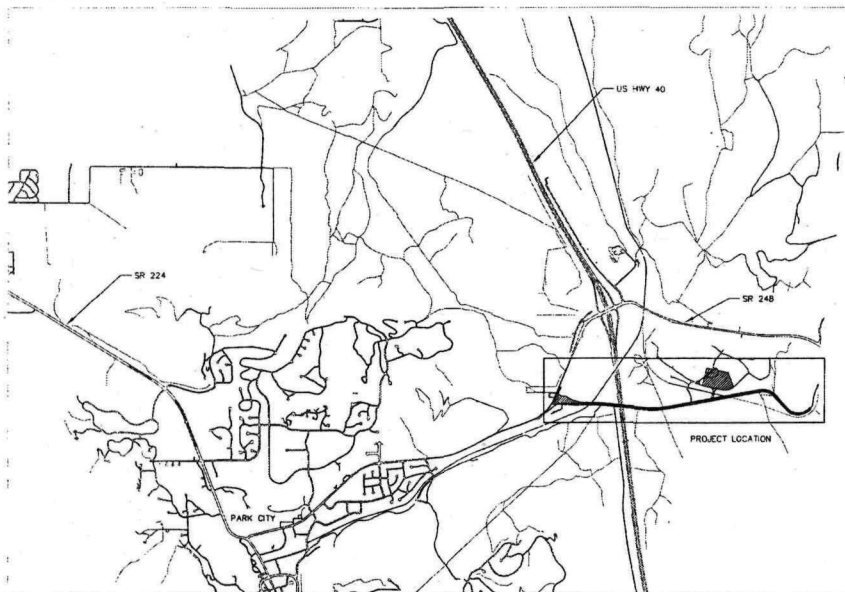
## SHEET INDEX

1. TITLE SHEET
2. OVERALL SITE PLAN
3. SIGNAGE & STRIPING PLAN
4. COUNTY ROAD STATION 0+00-15+00
5. COUNTY ROAD STATION 15+00-30+00
6. COUNTY ROAD STATION 30+00-45+00
7. COUNTY ROAD STATION 45+00-60+00
8. COUNTY ROAD STATION 60+00-66+25
9. PARK AND RIDE LOT LANDSCAPE PLAN
10. PARK AND RIDE LOT SITE PLAN
11. DRIVEWAY AND LOT ROAD SECTIONS
12. SILVER CREEK CULVERT \*DEFERRED SUBMITTAL\*
13. DETAILS
- ES1 PARK AND RIDE LOT ELECTRICAL PLAN
- ES2 PARK AND RIDE LOT SITE PLAN-PHOTOMETRIC
- EO1 ELECTRICAL DETAILS, NOTES, SYMBOLS, SCHEDULES

## GENERAL NOTES

1. ALL WORK PERFORMED SHALL BE DONE IN ACCORDANCE WITH THE FOLLOWING PLANS & SPECIFICATIONS.
  - A. Summit County Design Standards, Construction Specifications, and Standard Drawings, Latest Edition.
  - B. UDOT Design Standards, Construction Specifications, and Standard Drawings, Latest Edition.
  - C. Special conditions of approval and/or permits as required and/or issued by regulatory bodies.
  - D. Approved construction plans and details.
  - E. Approved Construction Mitigation Plan and Approved Traffic Control Plan.
  - F. Storm Water Management Plans.
2. The Contractor shall be responsible for ground and surface water control during construction. This requirement shall include, but not be limited to, the installation of ditches, manholes, vaults, catch basins, stormwater collectors, and road construction.
3. The Contractor shall maintain accurate records of "As Built" conditions of all underground work. The "As Built" shall be tied to easily defined monuments and/or surface improvements or as required by accuracy for the "As Built" conditions. The "As Built" information shall be given to the owner and be incorporated in the final "As Built" drawings.
4. Prior to any excavation work, the contractor shall contact Blue Stakes for location of existing utilities. The contractor shall be responsible for determining the location of utilities, whether shown on the plans or not, and protecting the utilities during construction. If existing utility lines conflict in location with new construction, the contractor shall notify the engineer in order to resolve the conflict.
5. Construction staking will be provided by the owner. The contractor shall save and protect construction survey stakes. Re-staking required, due to the failure of the contractor to save and protect the stakes, shall be paid for by the contractor.
6. All work performed shall be guaranteed by the contractor and/or his surety against all defects in materials and workmanship at whatever nature for a period of one (1) year from the date of substantial completion of the work.
7. The contractor shall be responsible for the installation and maintenance of adequate signs, traffic devices, and warning devices to inform and protect the public during all phases of construction. The contractor shall submit to the Engineer for approval, prior to construction, a Traffic Control Plan indicating the type and location of construction signage, traffic control, traffic detouring, and street closures, necessary during the construction of the improvements. The traffic control plan shall comply with MUTCD 2003 Edition, Part 6.
8. Compression testing shall be an integral part of the project. Compression testing shall include, but shall not be limited to, asphalt, trench back-fill, base material, and concrete. Compression testing shall be performed by a certified, independent testing company retained by the developer.
9. Contractor shall obtain a USDES permit and prepare a Storm Water Pollution Prevention Plan (SWPPP) for review by County Engineer.

## VICINITY MAP



# RICHARDSON FLAT PARK & RIDE 2008

## PREPARED FOR

TALISKER MOUNTAIN INC.  
P.O. BOX 1450  
900 MAIN STREET, SUITE 6107  
PARK CITY, UTAH 84060

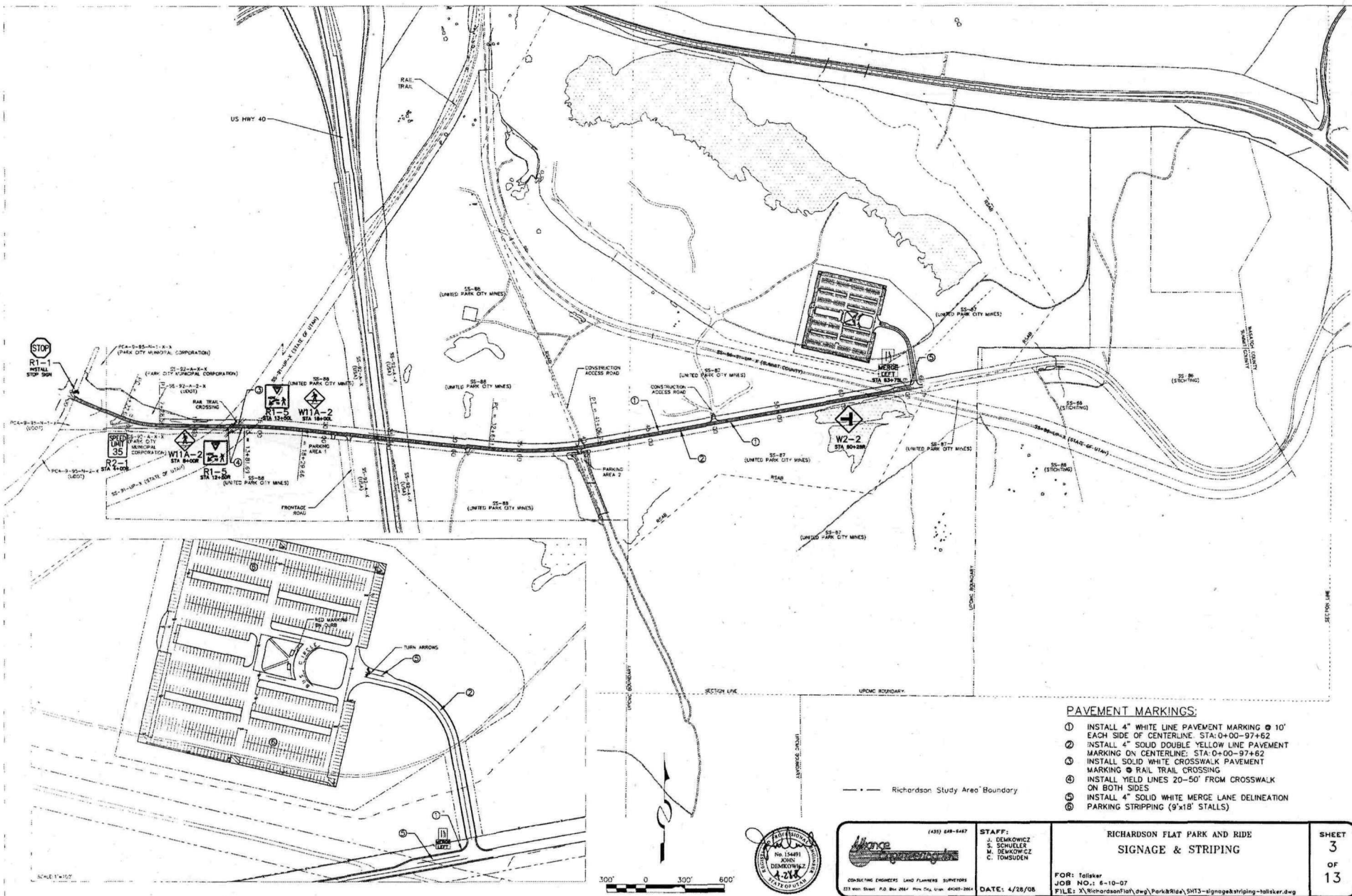
## CIVIL ENGINEER

ALLIANCE ENGINEERING, INC.  
PO BOX 2664 - 323 MAIN STREET  
PARK CITY, UTAH 84060  
PHONE: (435) 649-9467  
FAX: (435) 649-9475









# PAVEMENT MARKINGS:

- ① INSTALL 4" WHITE LINE PAVEMENT MARKING @ 10' EACH SIDE OF CENTERLINE. STA: 0+00-97+62
- ② INSTALL 4" SOLID DOUBLE YELLOW LINE PAVEMENT MARKING ON CENTERLINE. STA: 0+00-97+62
- ③ INSTALL SOLID WHITE CROSSWALK PAVEMENT MARKING @ RAIL TRAIL CROSSING
- ④ INSTALL YIELD LINES 20'-50' FROM CROSSWALK ON BOTH SIDES
- ⑤ INSTALL 4" SOLID WHITE MERGE LANE DELINEATION PARKING STRIPPING (9'x18' STALLS)



STAFF:  
J. DEMKOWICZ  
S. SCHULER  
M. DEMKOWICZ  
C. TOMSUDEN

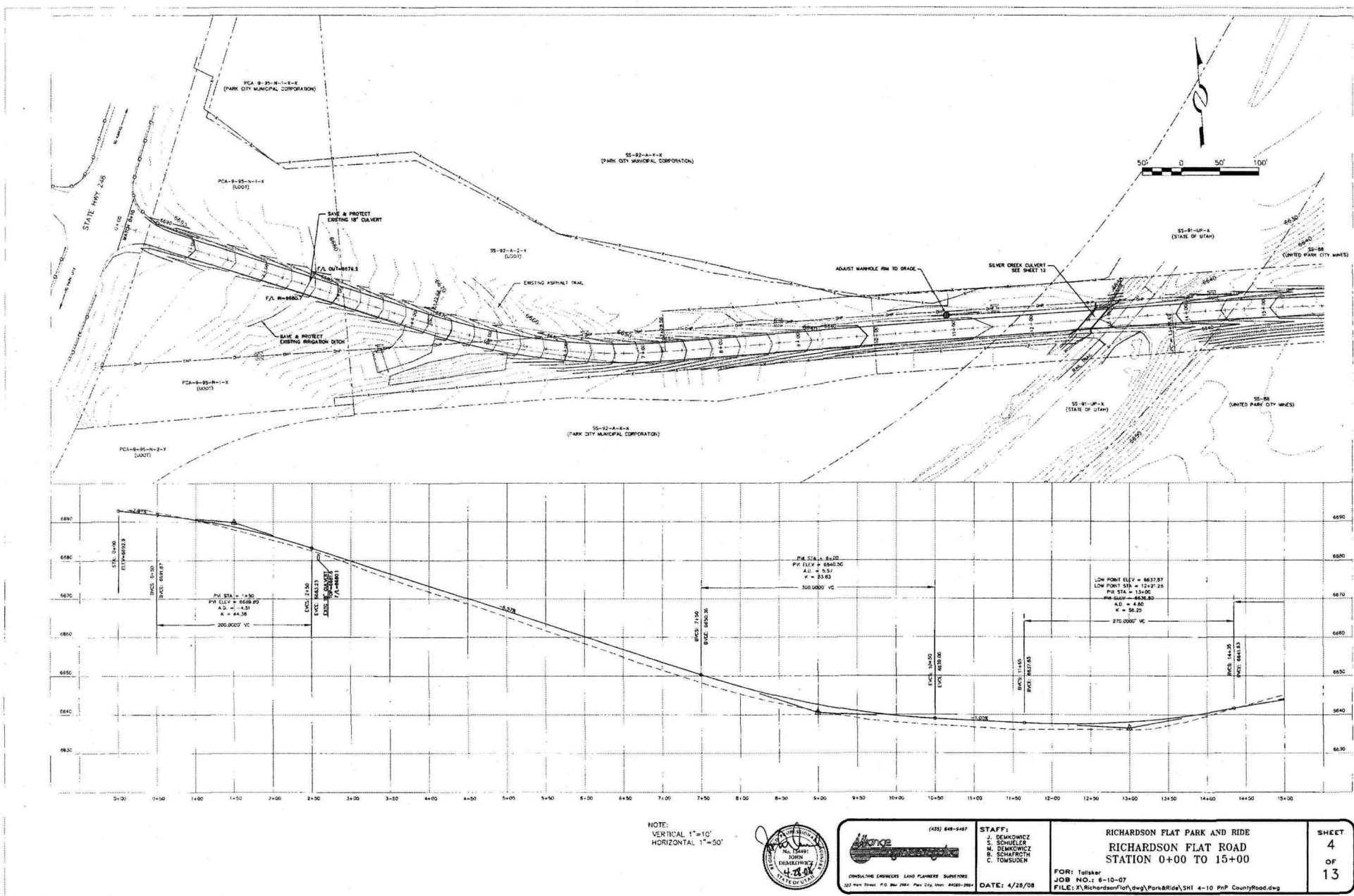
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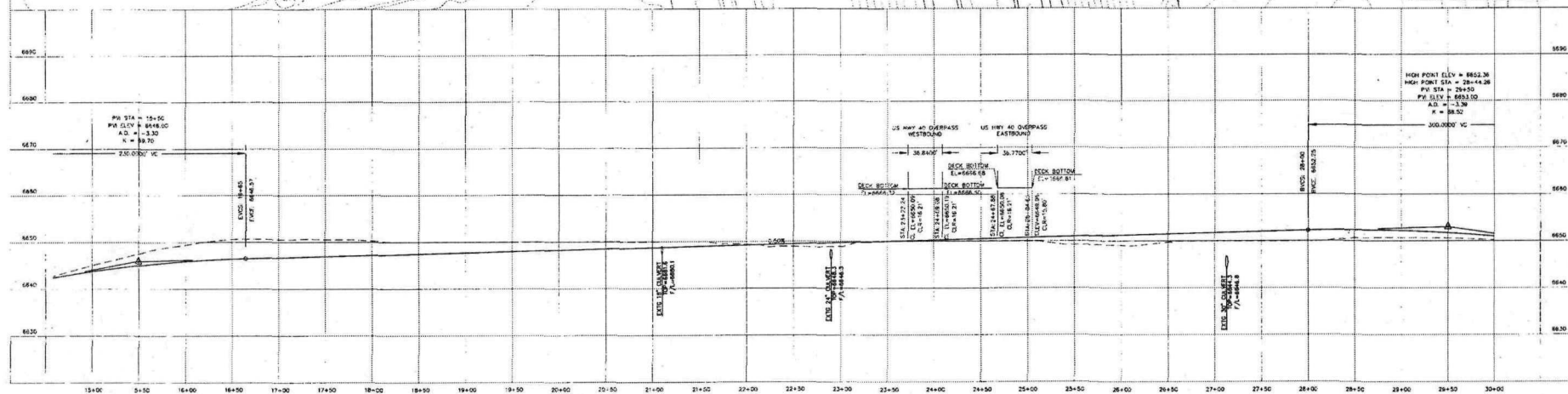
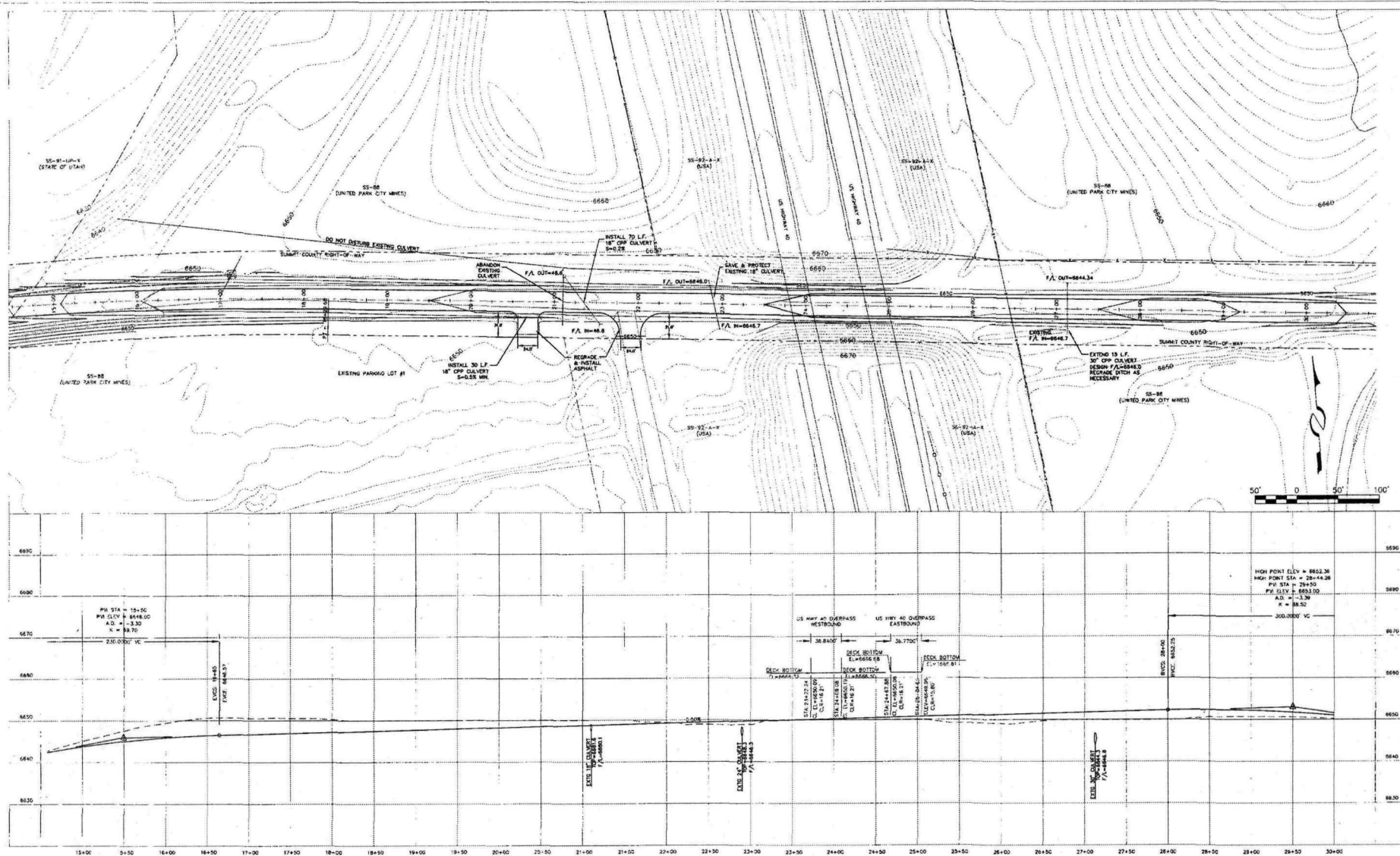
## RICHARDSON FLAT PARK AND RIDE SIGNAGE & STRIPING

FOR: Tolleser  
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SHEET  
3  
OF  
13







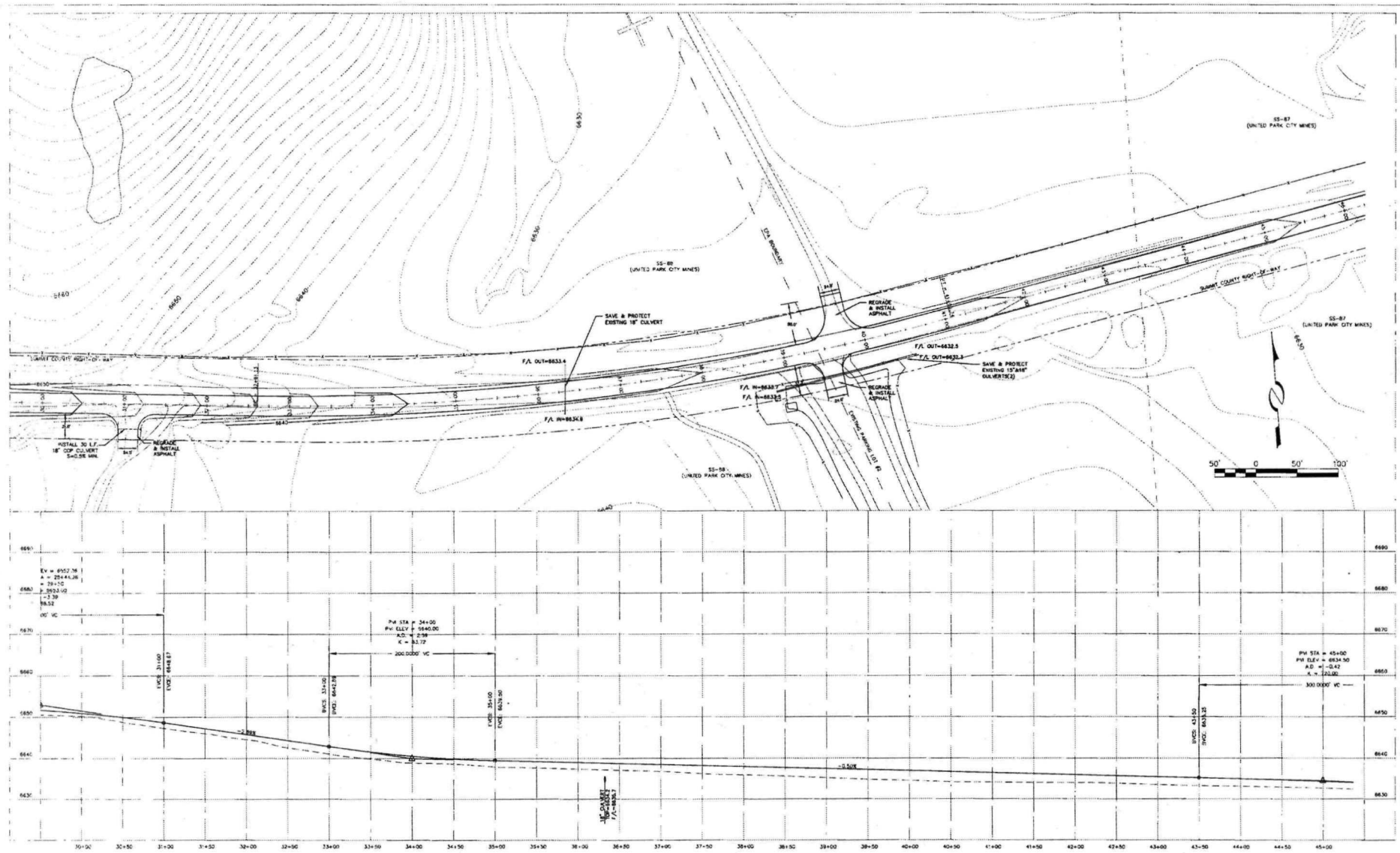
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HORIZONTAL 1"=50'



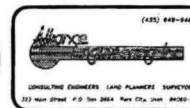
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J. DEMKOWICZ  
M. SCHULER  
M. DEMKOWICZ  
B. SCHARFROTH  
C. TOMSUDEN

RICHARDSON FLAT PARK AND RIDE  
RICHARDSON FLAT ROAD  
STATION 15+00 TO 30+00  
FOR: Tallahassee  
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SHEET  
5  
OF  
13



NOTE:  
VERTICAL 1"=10'  
HORIZONTAL 1"=50'



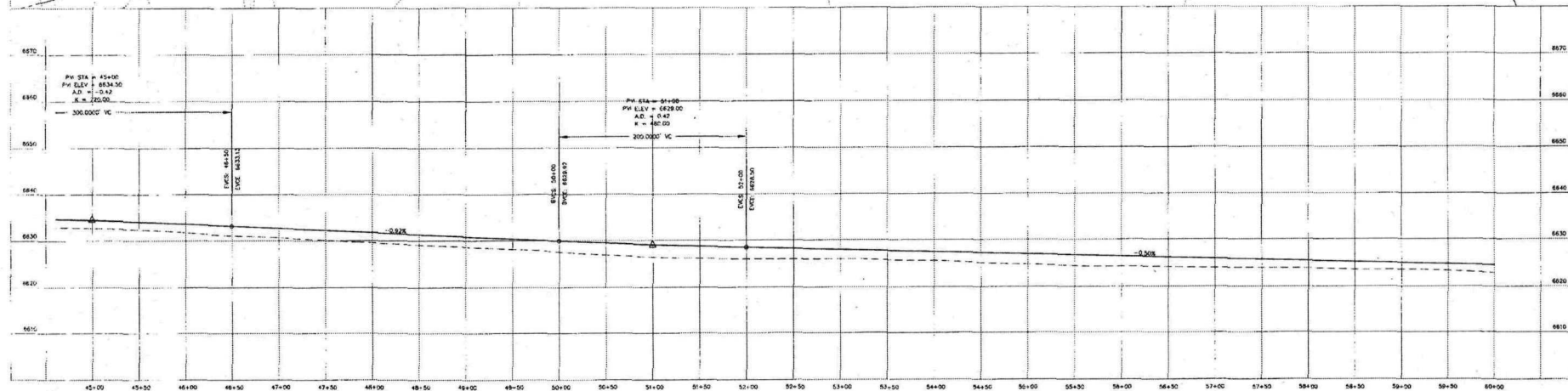
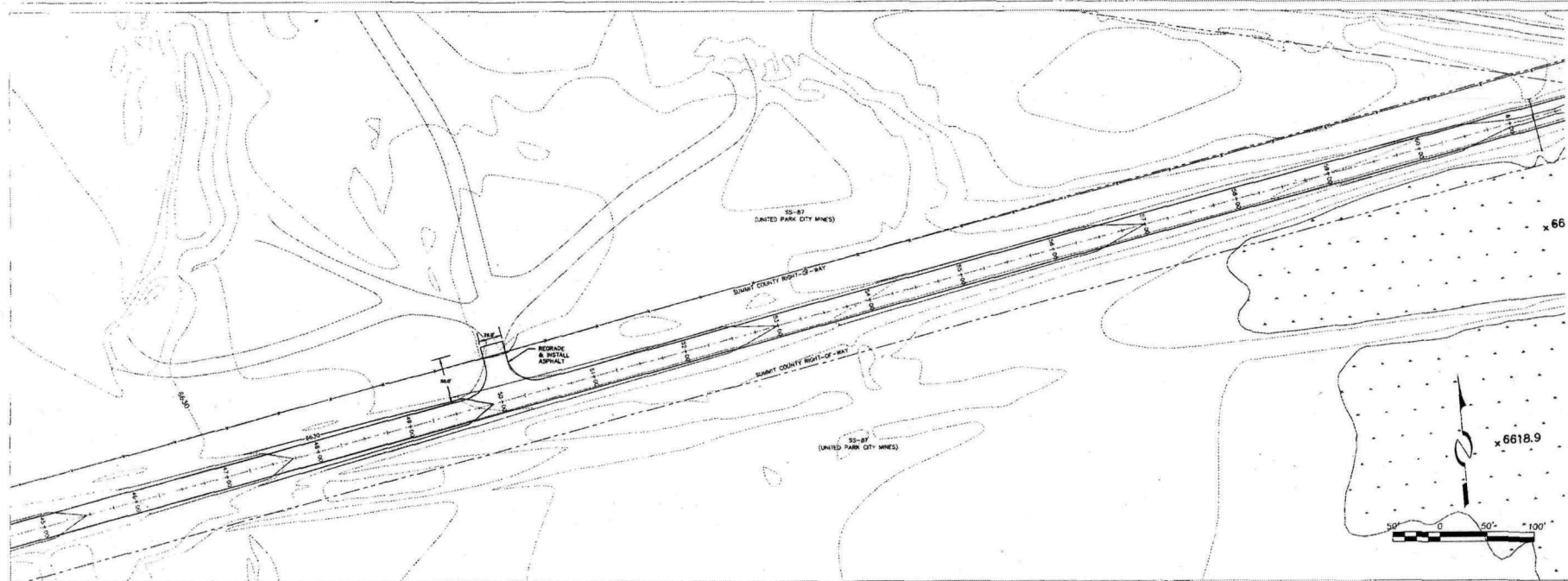
STAFF:  
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S. SCHULLER  
M. DEMKOWICZ  
B. SCHAFROTH  
C. TOMSUDEN

DATE: 4/28/08

FOR: Tolleson  
JOB NO.: 6-10-07  
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RICHARDSON FLAT PARK AND RIDE  
RICHARDSON FLAT ROAD  
STATION 30+00 TO 45+00

SHEET  
6  
OF  
13



NOTE:  
VERTICAL 1"=10'  
HORIZONTAL 1"=50'



(435) 849-8467

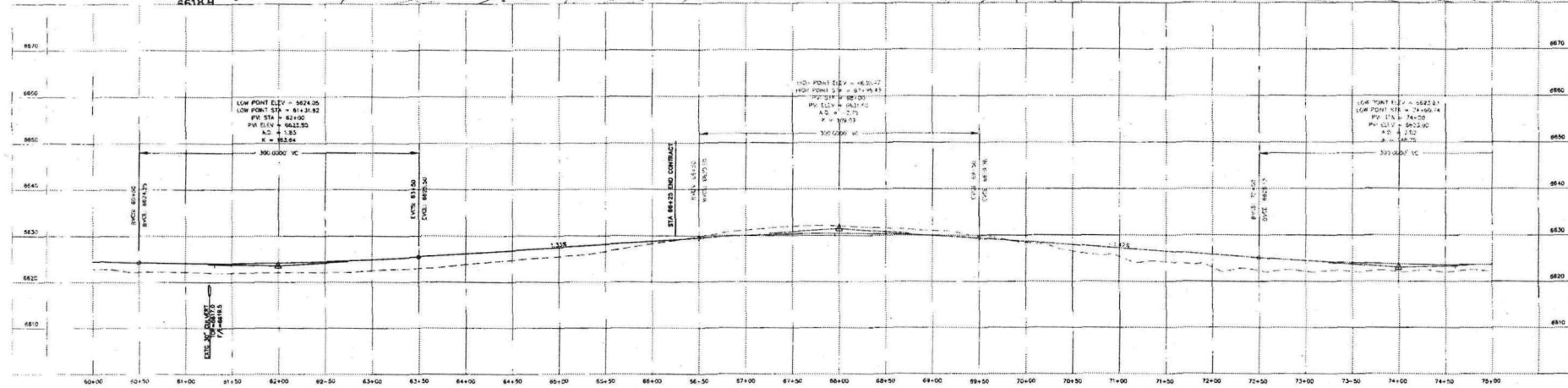
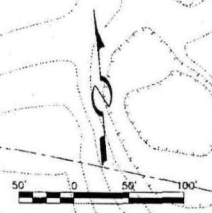
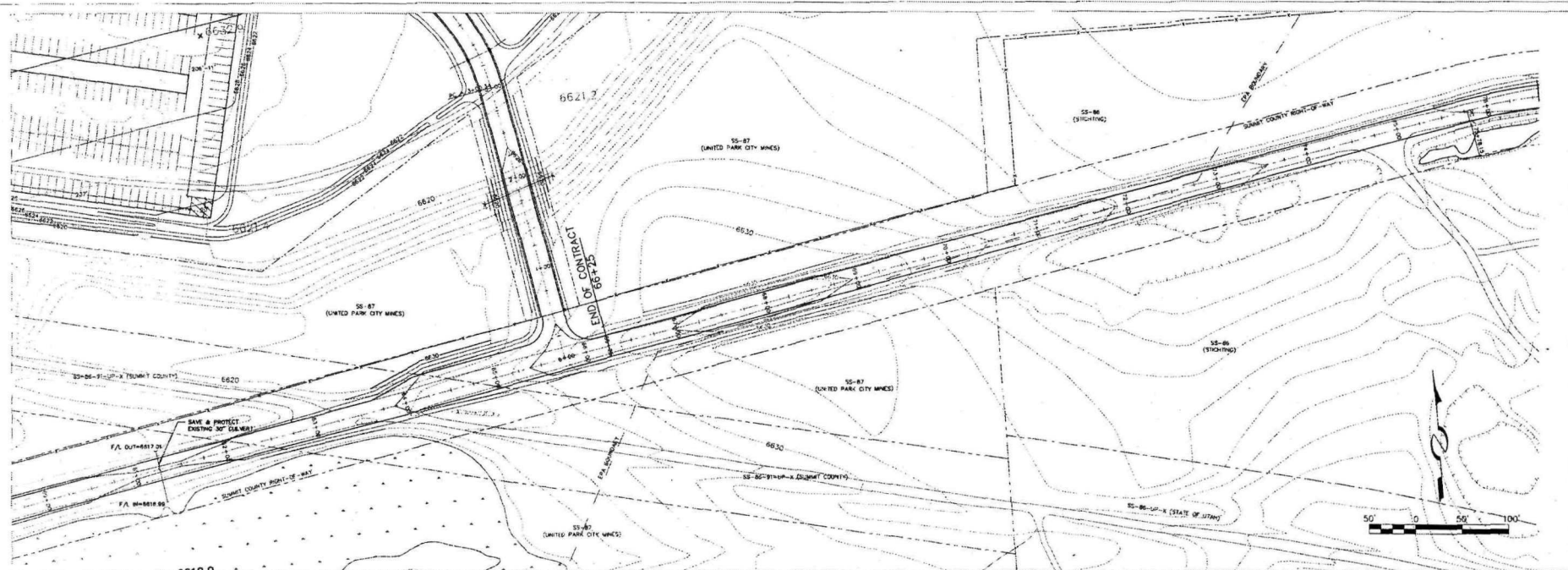
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M. DEMKOWICZ  
B. SCHARFSTEIN  
C. TOMSUDEN

DATE: 4/28/08

FOR: Tallaker  
JOB NO.: 6-10-07  
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RICHARDSON FLAT PARK AND RIDE  
RICHARDSON FLAT ROAD  
STATION 45+00 TO 60+00

SHEET  
7  
OF  
13



NOTE:  
VERTICAL 1"=10'  
HORIZONTAL 1"=50'



**W&P**  
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M. SEMOWICZ  
B. SCHAROTH  
C. TOMSDUDEN  
**DATE:** 4/28/08

**RICHARDSON FLAT PARK AND RIDE  
RICHARDSON FLAT ROAD  
STATION 60+00 TO 66+25**  
FOR: Towner  
JOB NO.: 8-10-07  
FILE: X:\RichardsonFlat\dwg\Park&Ride\SH1 4-10 PnP CountyRoad.dwg

**SHEET  
8  
OF  
13**



# PLANTING LEGEND

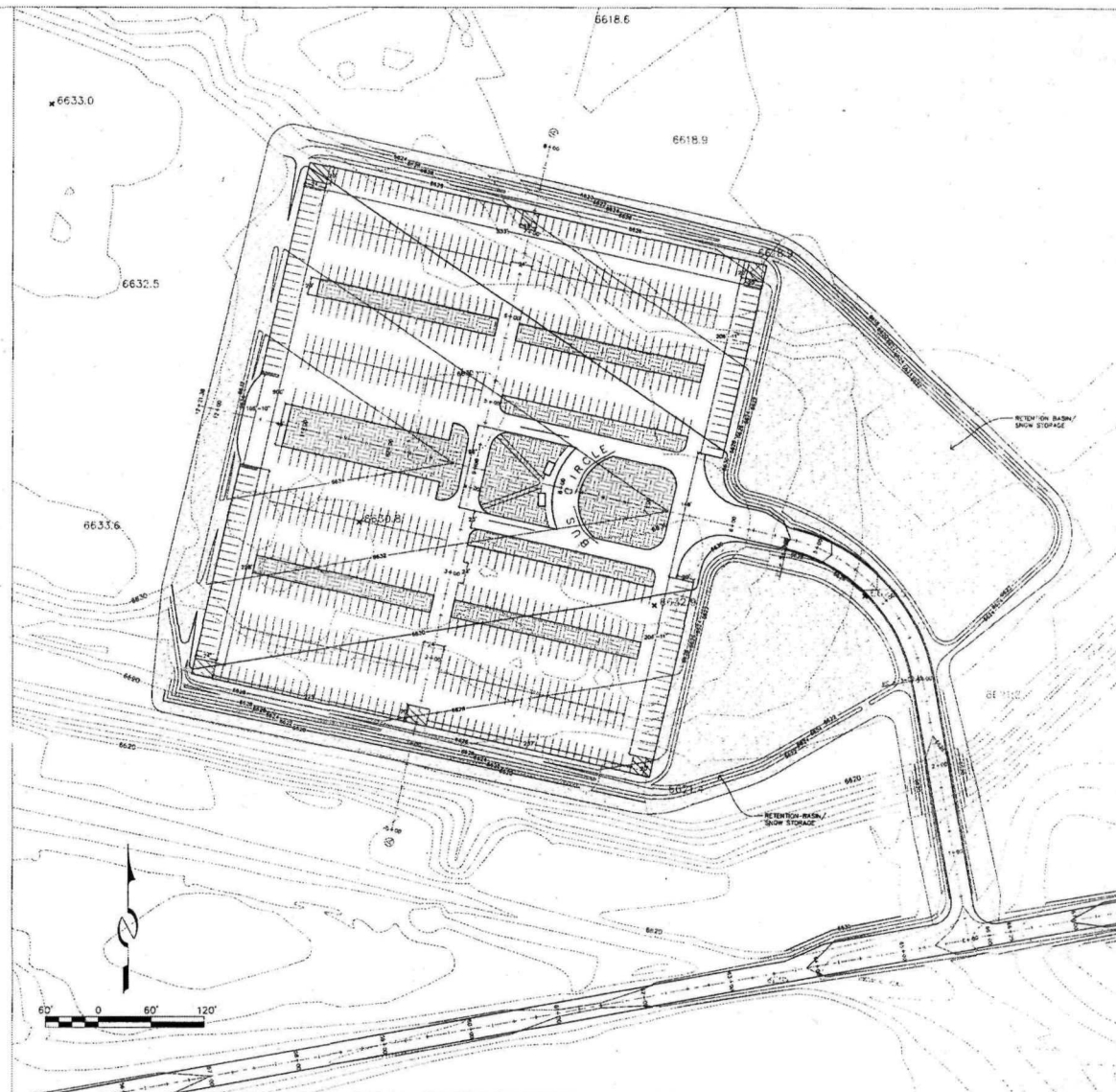
Native Revegetation Topsoil & Hydroseed Mix  
Perimeter landscaping- 257,000 SF

Revegetated Planters  
Backfill with Topsoil

## Native Revegetation Hydroseed Mix

Slender wheatgrass	Agropyron trachycaulum	15%
Nevada bluegrass	Poa serotensis	10%
Squirreltail	Silene bryonia	9%
Bluebonnet wheatgrass	Agropyron spicatum	20%
Western wheatgrass	Agropyron smithii	10%
Thickspike wheatgrass	Agropyron dasystachyum	10%
Mountain (California) brome	Bromus cuneatus	15%
Yarrow	Achillea millefolium	0.25%
Blue flax	Linum perenne	0.5%
Silver lupine	Lupinus argenteus var. argenteus	0.25%
Pyg	Lupinus perenne	10%

- Landscape Notes:
- 1) Native Revegetation Hydroseed Mix (THD) shall include Sage and Rabbit Brush seed
  - 2) Seeded areas shall be sown at a minimum of 4 pounds per 1,000 sf.
  - 3) No permanent irrigation is currently available in this location. All plants to be hand watered by a water truck for a period of one year, or until established.
  - 4) All disturbed areas to be revegetated with Summit County approved native grasses.
  - 5) A minimum of 8" of topsoil shall be evenly spread over all planting areas.



**HART HOWERTON**  
PLANNERS • ARCHITECTS  
LANDSCAPE ARCHITECTS

Robert L. Hart, Architect, AIA, AICP  
David P. Howerton, AIA, AICP  
Alan Howerton, LTD  
The Union Square San Francisco, California 94111  
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STAFF:  
J. DEMKOWICZ  
S. SCHUELER  
M. DEMKOWICZ

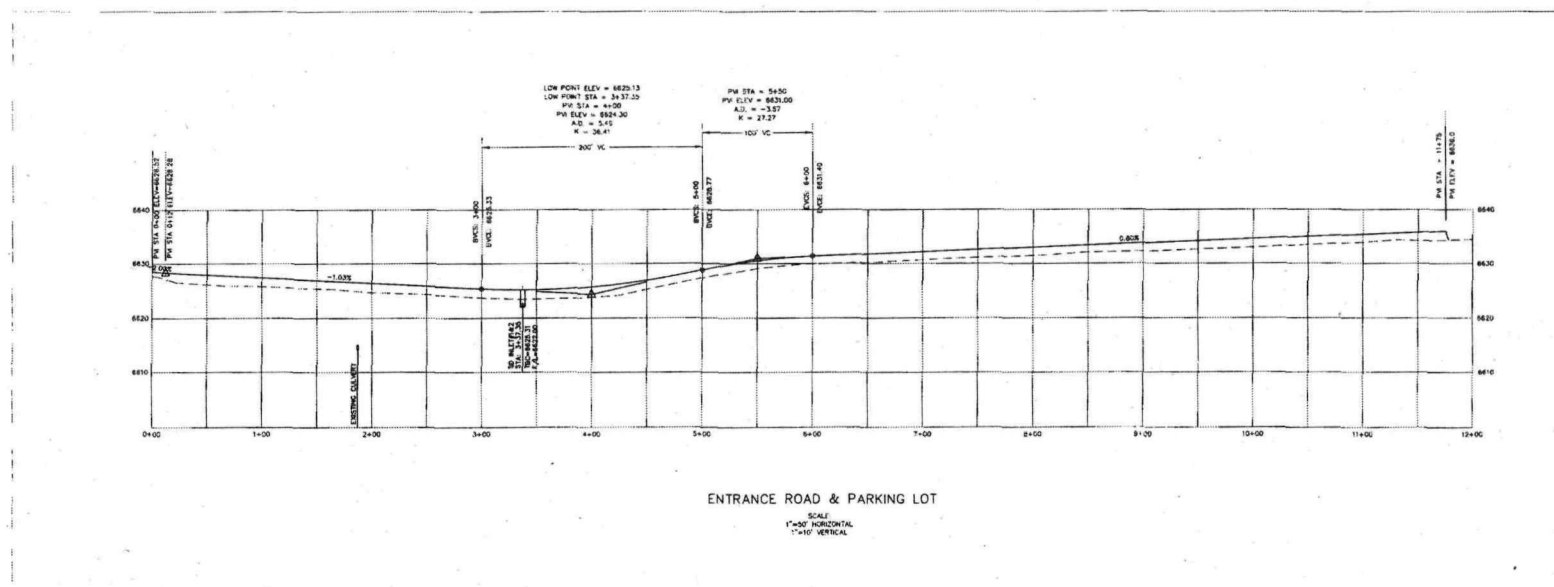
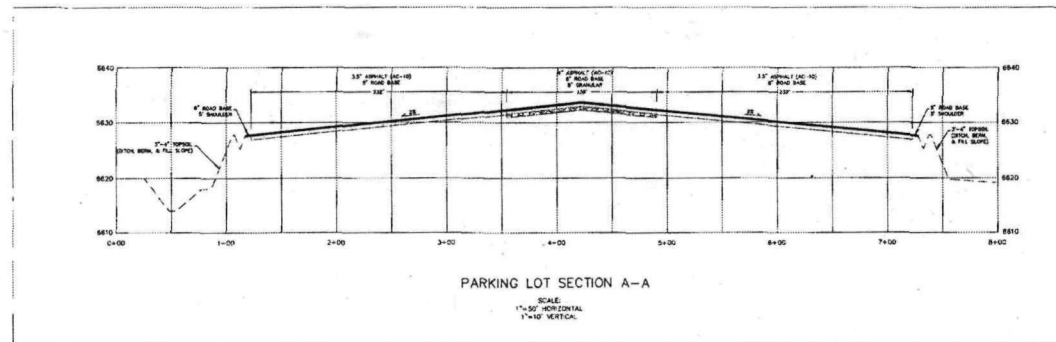
DATE: 4/28/08

RICHARDSON FLAT PARK AND RIDE  
PARK AND RIDE LOT  
LANDSCAPE PLAN

FOR: Toller  
JOB NO.: 6-10-07  
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SHEET  
9  
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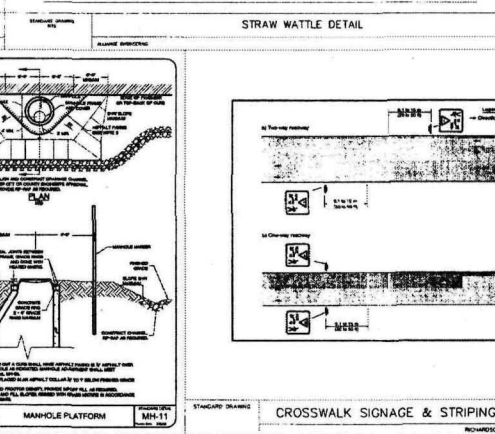
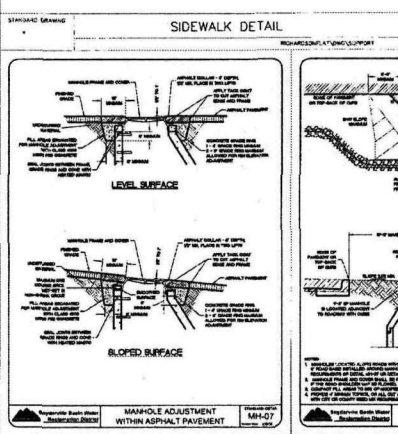
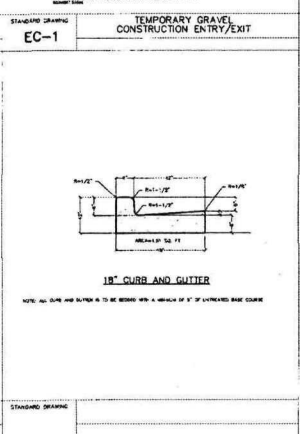
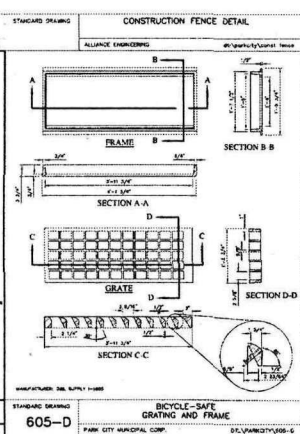
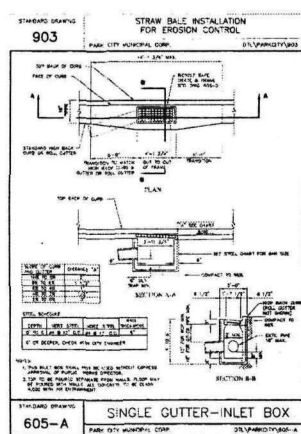
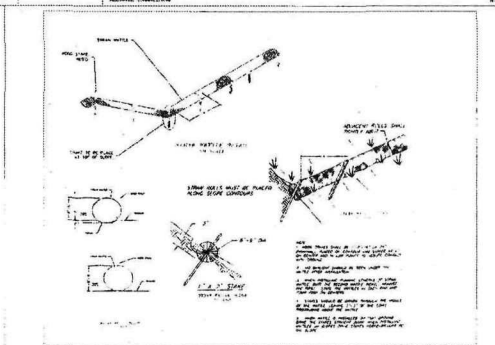
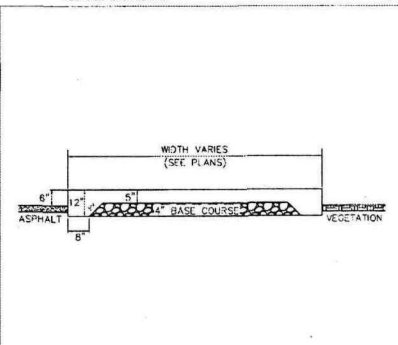
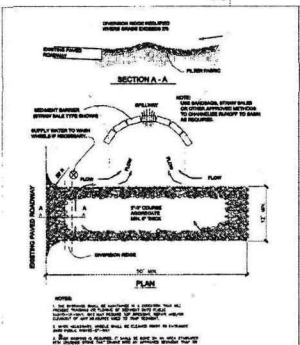
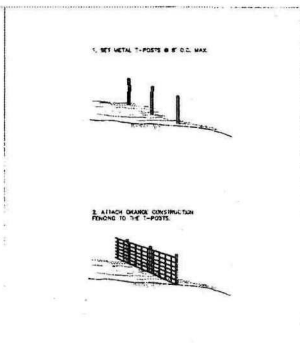
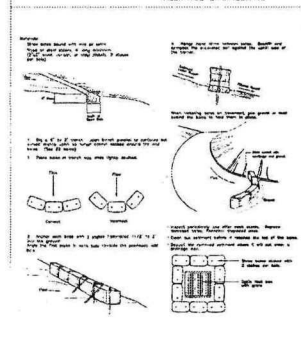
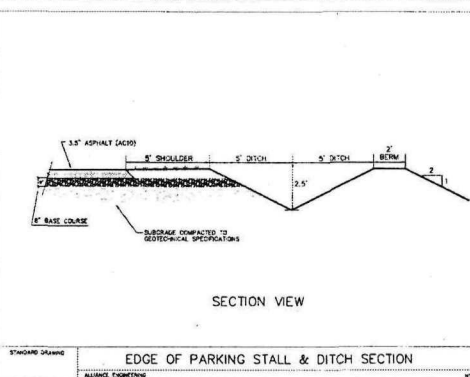
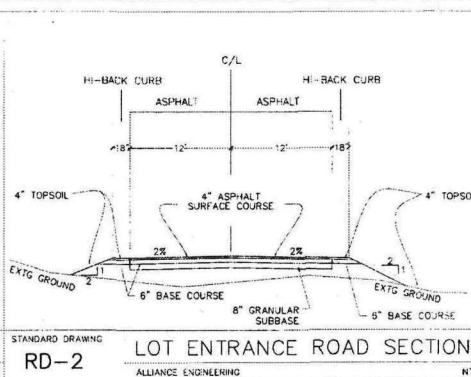
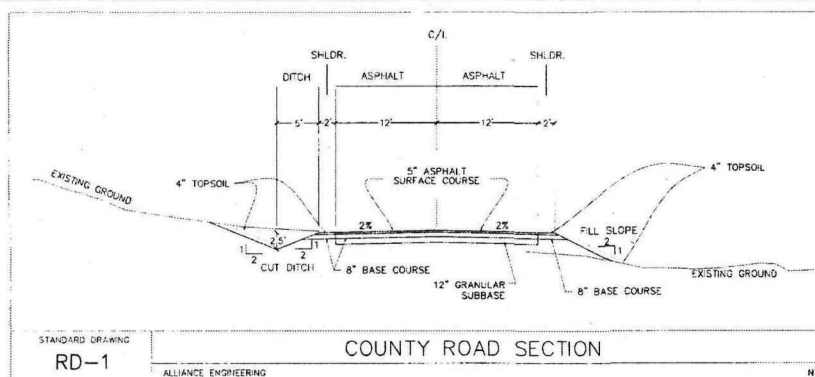
STAFF:  
J. DEMKOWICZ  
M. DEMKOWICZ  
C. TOMSUDEN

RICHARDSON FLAT PARK AND RIDE  
DRIVEWAY & PARKING LOT PROFILES

FOR: TALISKER  
JOB NO.: 8-10-07  
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SHEET  
11  
OF  
13





**4.28.08**

COOPERATING ENGINEERS AND PLANNERS SURVEYORS

317 N. 1000 E. SUITE 100 P.O. BOX 2000 P.O. BOX 2000

STAFF:

J. DENKOWICZ

S. SCHUELER

B. SCHARNOCH

C. TOMSUDEN

DATE: 4/28/08

RICHARDSON FLAT PARK AND RIDE PROJECT DETAILS

FOR: TALISKER

JOB NO.: 8-10-07

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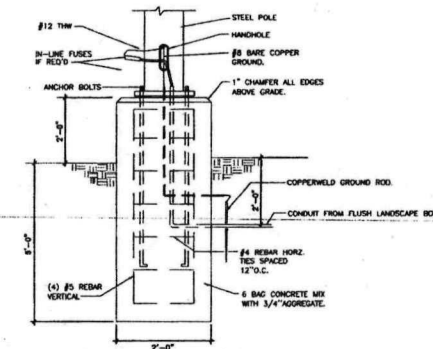
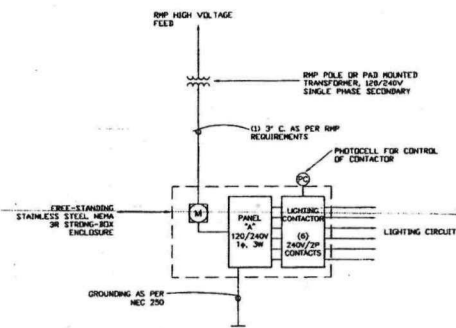
SHEET 13 OF 13

LIGHT FIXTURE SCHEDULE				
TYPE	MANUFACTURER	CATALOG NUMBER	LAMPING	DESCRIPTION
P1	T.B.D.	T.B.D.	100 W HPB	SINGLE HEAD POLE LIGHT FIXTURE, FULL OUTPUT, 1/4" POLE (1/4" O.A.H. W/ CONDUIT BASE), TYPE 2 DISTRIBUTION
PIA	T.B.D.	T.B.D.	100 W HPB	SAME AS P1 BUT TYPE 2 DISTRIBUTION
P2	T.B.D.	T.B.D.	100 W HPB	SAME AS P1 BUT TWIN HEADS AT 180 DEGREES

GENERAL NOTES	
①	LOCATIONS OF EQUIPMENT AND CONDUIT ROUTING ARE SCHEMATIC. EXACT LOCATIONS TO BE COORDINATED WITH RESPECTIVE UTILITIES.
②	ALL UNDERGROUND CONDUIT SHALL BE BURIED 24" MINIMUM UNDER THE GROUND.

SHEET INDEX	
ED1	DETAILS, NOTES & SYMBOLS
ES1	PARKING LOT ELECTRICAL PLAN
ES2	PARKING LOT PHOTOGRAPHIC PLAN

PANEL "A"				LOCATION:						
VOLTAGE: 120 / 240 PHASE: 1 WIRE: 3 NEUTRAL: 1 PEED: BOTTOM FEED										
MOUNTING: SURFACE				MISC: 10						
MAREL: 100 AMP				MAREL TYPE: MCB						
				PHASES						
CONT.	AMP	P	CIRCUIT DESCRIPTION	KVA	A	B	KVA	CIRCUIT DESCRIPTION	P	AMP
1	30	2	LIGHTING CIRCUIT 1	0.00	0.00			LIGHTING CIRCUIT 4	2	30
2	30	1	LIGHTING CIRCUIT 1	0.00				LIGHTING CIRCUIT 5	1	30
3	30	2	LIGHTING CIRCUIT 2	0.00				LIGHTING CIRCUIT 6	1	30
4	30	1	LIGHTING CIRCUIT 2	0.00	0.00			LIGHTING CIRCUIT 7	1	30
5	30	2	LIGHTING CIRCUIT 3	0.00	0.00			LIGHTING CIRCUIT 8	2	30
6	30	1	LIGHTING CIRCUIT 3	0.00				LIGHTING CIRCUIT 9	1	30
7	30	2	LIGHTING CIRCUIT 4	0.00				LIGHTING CIRCUIT 10	2	30
8	30	1	LIGHTING CIRCUIT 4	0.00				LIGHTING CIRCUIT 11	1	30
9	30	2	LIGHTING CIRCUIT 5	0.00				LIGHTING CIRCUIT 12	2	30
10	30	1	LIGHTING CIRCUIT 5	0.00				LIGHTING CIRCUIT 13	1	30
11	30	2	LIGHTING CIRCUIT 6	0.00				LIGHTING CIRCUIT 14	2	30
12	30	1	LIGHTING CIRCUIT 6	0.00				LIGHTING CIRCUIT 15	1	30
13	30	1	SPARE	0.00			0.00	SPACE ONLY		
14	30	1	SPARE	0.00			0.00	SPACE ONLY		
15	30	1	SPARE ONLY	0.00			0.00	SPACE ONLY		
16	30	1	SPARE ONLY	0.00			0.00	SPACE ONLY		
17	30	1	SPARE ONLY	0.00			0.00	SPACE ONLY		
18	30	1	SPARE ONLY	0.00			0.00	SPACE ONLY		
19	30	1	SPARE ONLY	0.00			0.00	SPACE ONLY		
20	30	1	SPARE ONLY	0.00			0.00	SPACE ONLY		
21	30	1	SPARE ONLY	0.00			0.00	SPACE ONLY		
22	30	1	SPARE ONLY	0.00			0.00	SPACE ONLY		
23	30	1	SPARE ONLY	0.00			0.00	SPACE ONLY		
KVA PER PHASE:				0.00	0.00	TOTAL KVA:				0.00
AMPS PER PHASE:				0	0	AVERAGE AMPS:				0.0
NOTES: INTEGRAL WIRE BUNDLING BOX										
OPTIONAL:										



1900 W. ALABAMA ST. SALT LAKE CITY, UT 84119

HUNT

DESIGN-BUILD SERVICES

PROJECT NO. 2024-001

DATE: 11/15/2023

DRAWN BY: BRADDOCK WHITE

PROJECT MGR: DARREN SANKER

PROJECT NO. 2024-001

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PROJECT NO. 2024-001



## ES2



**Appendix B**  
**Park and Ride Lot**  
**Storm Water Pollution Prevention Plan**

# **STORMWATER POLLUTION PEVENTION PLAN**

## **RICHARDSON FLAT PARK AND RIDE Park City, Utah**

April 1, 2008

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<i>Site Map</i> .....	1
<i>Description of the Construction Activity</i> .....	1
<i>Description of the Sequence of Major Soil Disturbing Activities</i> .....	1
<i>Estimate of Total Disturbed Area</i> .....	1
<i>Estimate of the Runoff Coefficient</i> .....	2
<i>Description of Storm Water Permit Associated with Construction Activity</i> .....	2
<i>Name of Receiving Waters</i> .....	2
<b><u>CONTROLS</u></b> .....	2
<i>Responsible Parties for Implementation of Controls</i> .....	2
<i>Erosion and Sediment Controls</i> .....	2
<i>Stabilization Practices</i> .....	3
<i>Structural Practices</i> .....	3
<b><u>MAINTENANCE AND INSPECTION</u></b> .....	3
<b><u>REFERENCES</u></b> .....	4

## Attachments:

Figure 1	Richardson Flat Site Overview
Figure 2	Site Stormwater Protection Features
Table 1	Native Plant Species List
Appendix A	Erosion and Sediment Control BMPs

### **SITE DESCRIPTION**

United Park City Mines Company (UPCM) is constructing a parking lot to hold approximately 750 cars on property located in an area northeast of Park City known as Richardson Flat. This lot will facilitate the parking needs for a Park and Ride Lot operated by Park City Municipal Corporation (PCMC). Construction will be completed by a private contractor as per the Construction Drawings prepared by Alliance Engineering, Inc. dated March 6, 2008 and incorporated into this document by reference (Richardson Flat Park and Ride, Alliance, 2008). The construction of the lot will be phased with the access road being constructed separately from the lot itself. The project will be completed by November 2008.

The parking lot will be constructed on a portion of the Richardson Flat tailings impoundment that has undergone a completed remedy as per the EPA approved Remedial Design and Remedial Action Work Plan (RD/RA, RMC, 2007). All contaminated materials in the parking lot footprint and adjacent area have been covered with a minimum of eighteen inches of clean cover soil. Areas outside of the parking lot area are beyond the scope of this Stormwater Pollution Prevention Plan (SWPPP) and will be addressed according to the RD/RA.

#### ***Site Map***

A general site map for Richardson Flat is presented in Figure 1.

#### ***Description of the Construction Activity***

Construction activities include:

- Clear and Grub, earthwork and construction of parking subgrade.
- Construction of the drainage features (Figure 2).
- Installation of 15,000 square feet of landscape improvements, incorporating native species of vegetation as found in the surrounding areas (Table 1).
- This SWPPP will be revised if any additional construction activities are added.

#### ***Description of the Sequence of Major Soil Disturbing Activities***

The sequence of major activities will be: Limited clear and grub, minimal grading work to facilitate drainage, culvert installation where needed, compaction, placement of 12 inches of base course materials, compaction and placement of road base with final compaction, and installation on asphalt surface course. Off-pavement areas which are disturbed during construction will be revegetated in accordance with the RD/RA. Revegetated areas will be inspected and maintained per the requirements of the Operations and Maintenance Plan for the RD/RA.

#### ***Estimate of Total Disturbed Area***

The Construction Drawings show the approximate limits of disturbance that encompasses the lot as being 15.95 acres.



### ***Estimate of the Runoff Coefficient***

The work site is an existing disturbed area with limited vegetation in certain areas. The area is relatively flat with less than a 15-foot change in elevation across the proposed parking lot location. After construction and stabilization, the runoff coefficient of the adjacent fields and work area is estimated to increase slightly.

### ***Description of Storm Water Permit Associated with Construction Activity***

The Utah Department of Environmental Quality, Division of Water Quality has issued a UPDES Storm Water Permit for Construction Activities (General Multi-Sector Permit for Storm Water Discharges Associated with Industrial Activity) to UPCM for this job. The requirements for the UPDES Storm Water Permit for Construction Activities are incorporated herein by reference. All construction activities associated with this project are to comply with the stormwater permit and this SWPPP.

### ***Name of Receiving Waters***

No wetlands have been identified at the parking lot site. The project drains to a total containment system of detention ponds. Runoff will not enter any stream channel.

## **CONTROLS**

### ***Responsible Parties for Implementation of Controls***

The private contractor will be responsible for installing all of the erosion and sediment controls, soil stabilization, and structural storm water controls as indicated on the Construction Drawings and Figure of this SWPPP. The private contractor will be responsible for the ongoing maintenance of the controls within the parking lot area.

### ***Erosion and Sediment Controls***

The contractor shall install and maintain erosion and sediment controls to retain sediment on-site to the maximum extent practical. Controls are detailed on Figure 2 and in Appendix A.

- Silt fence barriers, berms or waddles shall be installed between the construction areas and the South diversion ditch, as shown on Figure 2. Silt fence, berm and waddle details are shown on appropriate sheets of the Appendix A. Silt fence or waddles will be installed before the start of construction activities where practical and will be maintained in place until vegetation is established.
- Straw bale inlet sediment filters or other sediment barriers will be installed at all culvert inlets immediately upon completion of construction of the inlet. Inlet protection will remain in place until stabilization of the drainage area serving the inlet is complete.
- Erosion and sedimentation controls shall remain in place until the construction is complete and revegetation is complete. If stabilization is not complete before the winter months, the controls shall remain in place throughout the winter months. This will allow the controls to be in place during snowmelt months when the site is most susceptible to erosion.

- If at any time the erosion and sediment controls are deemed to be inefficient or inadequate during inspections, UPCM will select more appropriate controls and revise this plan accordingly.
- If sediments escape the construction site, the contractor shall remove accumulation to minimize off-site impacts.
- Litter, construction debris, and construction fluids exposed to storm water shall be picked up prior to storm events or otherwise prevented from becoming a pollutant for storm water discharges.

#### ***Stabilization Practices***

- Existing vegetation will be preserved where possible.
- Temporary stabilization controls include mulching.
- Permanent or temporary stabilization will be initiated as soon as practical after construction activities have permanently or temporarily ceased or as set forth in the UPDES permit conditions.

#### ***Structural Practices***

Temporary structural practices include installation of silt fences or wattles and inlet protection as set forth in this SWPPP and in the Construction Drawings for the project. Permanent structural practices include the possible placement of rock in offsite areas that receive drainage, if needed.

### **MAINTENANCE AND INSPECTION**

UPCM will inspect sediment control Best Management Practices (BMPs) in accordance with the UPDES permit, this SWPPP and the Construction Drawings. The proposed BMPs may include, but shall not be limited to, temporary silt or sediment fences, sediment traps and detention ponds, gravel construction entrances and wash down pads to reduce or eliminate off site tracking, straw bale sediment carriers, establishment of temporary and permanent vegetative cover, use of straw mulch as a temporary ground cover, erosion control blankets, temporary interceptor dikes and swales, storm drain inlet protection, check dams, surface drains, pipe slope drains, level riprap pads for culvert outlet protection, reinforced soil retaining systems and gabions. At a minimum, UPCM will inspect controls once every 14 days, before anticipated storm events, and within 24 hours of storm events greater than 0.5 inches. UPCM will use an inspection form to document inspections. Typical controls are included in Appendix A.

A list of temporary and permanent erosion and sediment control BMPs and their typical design details is presented in Appendix A. The following erosion and sediment controls may be used on the project as necessary for the prevention of soil erosion and sediment control:

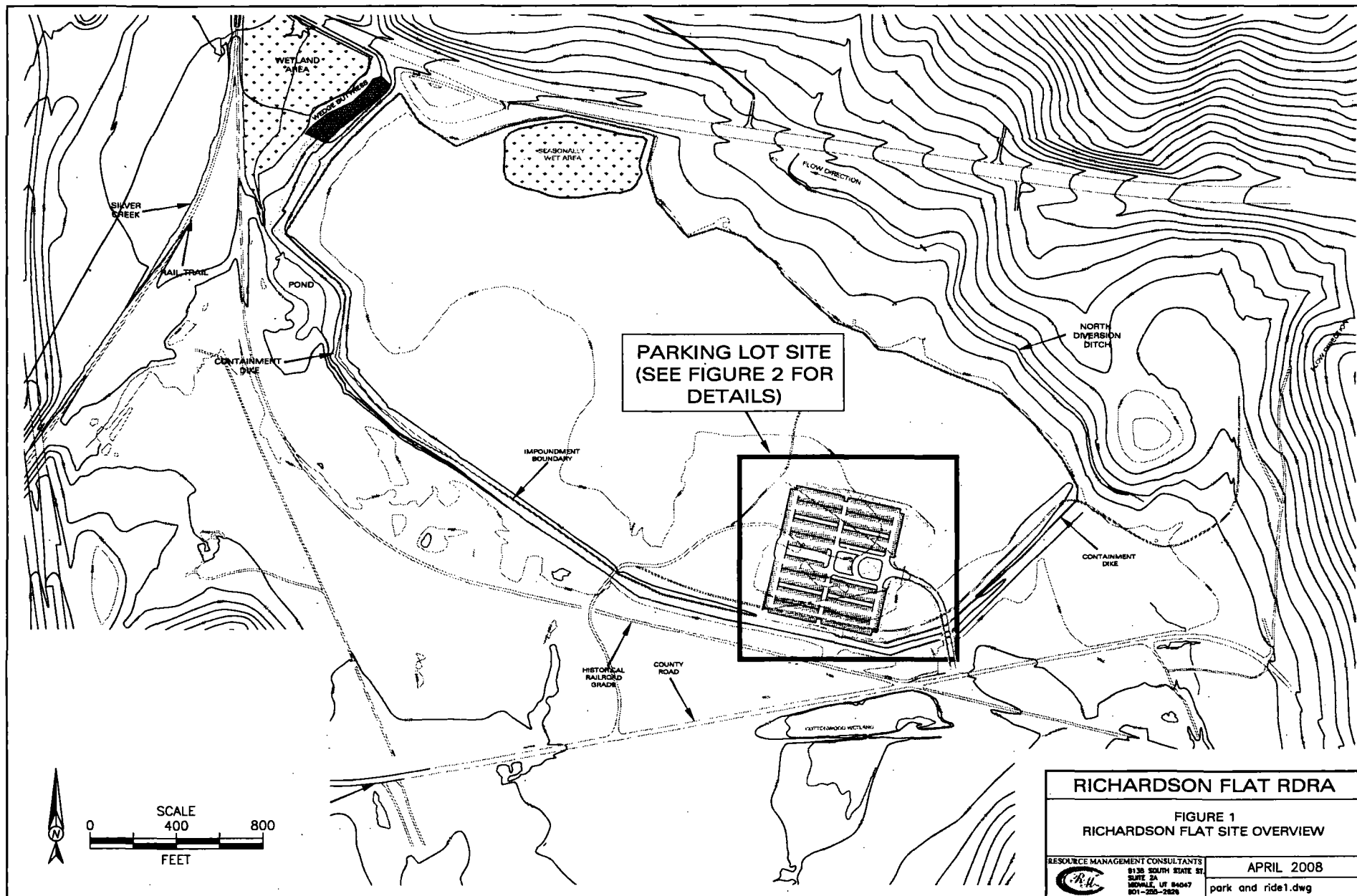
- (1) Revegetation
- (2) Mulching
- (3) Geotextiles
- (4) Silt Fence
- (5) Straw Bale Barrier

- (6) Stabilized Construction Entrance
- (7) Diversion Ditch/Dike
- (8) Water Bar
- (9) Storm Drain Inlet Protection
- (10) Brush Barrier
- (11) Gravel Check Dams
- (12) Straw Bale Check Dams
- (13) Slope Drains
- (14) Open Chute Drains
- (15) Rock Lined Ditches
- (16) Grassed/Matted Swales
- (17) Temporary Excavated Sediment Traps
- (18) Equipment and Vehicle Wash Down Area
- (19) Material Storage

## **REFERENCES**

Remedial Design and Remedial Action Work Plan (RD/RA), 2007, Resource Management Consultants, Inc. (RMC)

Richardson Flat Park and Ride 2008 – Construction Design Drawings (Construction Drawings), 2008, Alliance Engineering, Inc. (Alliance)



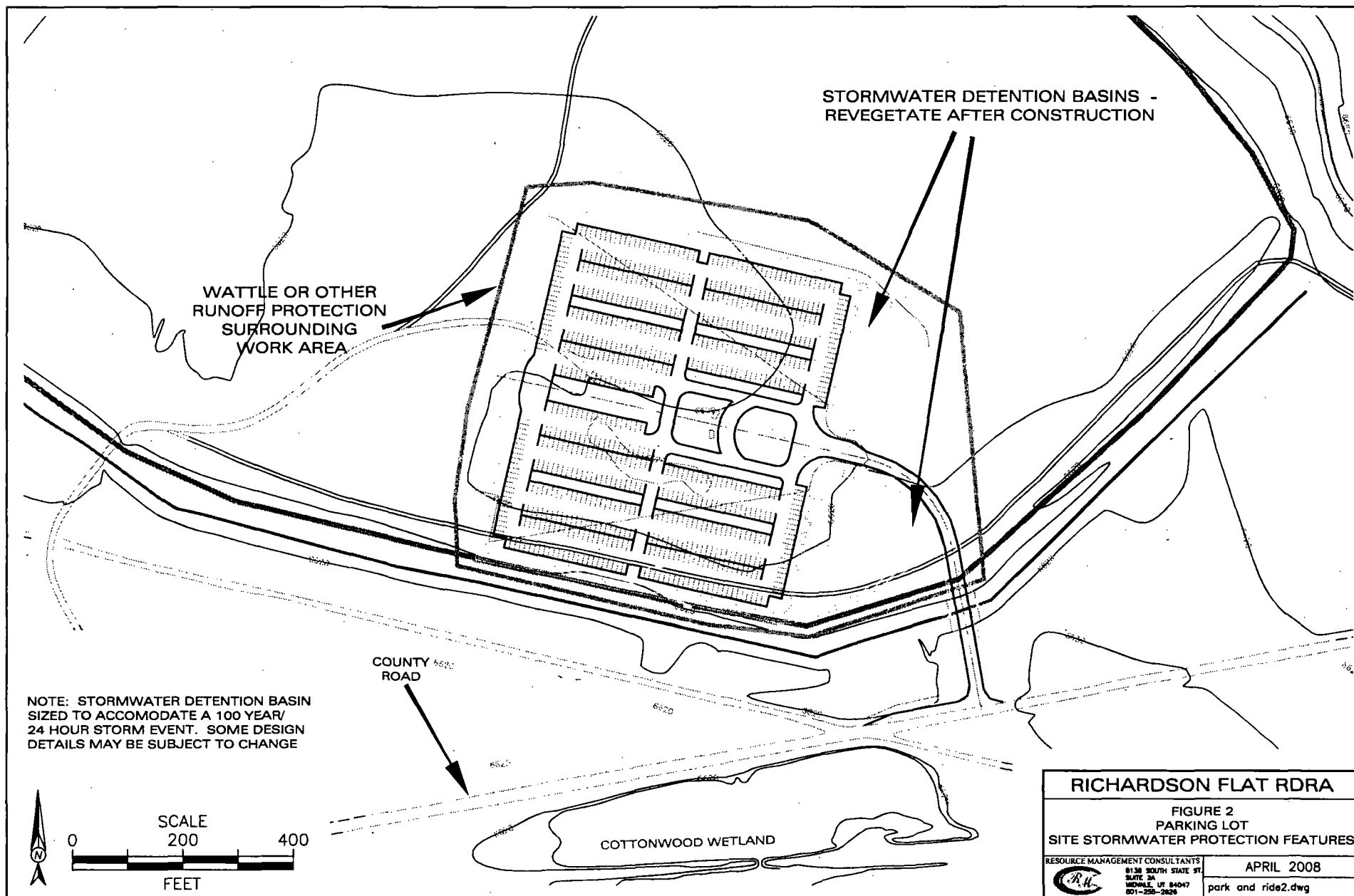
**RICHARDSON FLAT RDRA**

**FIGURE 1  
RICHARDSON FLAT SITE OVERVIEW**

RESOURCE MANAGEMENT CONSULTANTS  
 8135 SOUTH STATE ST.  
SUITE 2A  
BOZEMAN, MT 59707  
801-255-2826

APRIL 2008

park and ride1.dwg



**Table 1 – Native Plant Species List**

Slendor Wheatgrass	Agropyron trachycaulum	15%
Nevada Bluegrass	Poa nevadensis	10%
Squirreltail	Sitanion hystrix	9%
Bluebunch Wheatgrass	Agropyron spicatum	20%
Western Wheatgrass	Agropyron smithii	10%
Thickspike Wheatgrass	Agropyron dasystachyum	10%
Mountain (California) Brome	Bromus carinatus	15%
Yarrow	Achillea millifolium	0.25%
Blue Flax	Linum Perenne	0.5%
Silver Lupine	Lupirus orgentaus	0.25%
Rye	Lollum perenne	10%

\*Sandberg bluegrass (Poa sandbergii) may be substituted if Nevada bluegrass is not available.

**Landscape Notes:**

- 1) Native re-vegetation hydro seed mix (TBD) shall include Sage and Rabbit Brush seed.
- 2) Seeded areas shall be sown at a minimum of 4 lbs per 1,000 SF.
- 3) No permanent irrigation is currently available in this location. All plants to be hand watered by a water truck for a period of one year, or until established.
- 4) All disturbed areas to be re-vegetated with Summit County approved native grasses.
- 5) A minimum of 6" topsoil shall be evenly spread over all planting areas.

## **Appendix A: Erosion and Sediment Controls**

This list is not to be construed to be the limit of available BMPs, only as a partial list, and as examples which may be employed.

## **REVEGETATION**

**DEFINITION:** Placement of seed material or sod over open area for temporary or permanent erosion control.

**PURPOSE:**

- Reduce velocity of storm water runoff.
- Reduce erosion by preventing rainfall directly hitting soil.

**APPLICATION :**

- All areas disturbed by construction activity, including cut and fill slopes.

**LIMITATIONS:**

- Revegetation on slopes steeper than 3:1 must utilize geotextiles to promote establishment of vegetative cover.

**INSTALLATION:**

**Temporary Seeding**

- Grade and shape the area to be seeded so that it will drain properly and accommodate seeding equipment.
- Loosen compacted soil by racking, or discing where hydraulic seeding will not be used, to provide for seed retention and germination.
- Apply seed and fertilization suitable for the area and season. The seed species and fertilization requirements must be developed by a professional or the local Soil Conservation Service Office.

**Permanent Seeding**

- Grade and shape the area to be seeded so that it will drain properly and accommodate seeding equipment. If slopes are steeper than 3:1, the use of hydraulic seeding equipment is encouraged.
- Loosen compacted soil by racking, or discing where hydraulic seeding will not be used, to provide for seed retention and germination.
- Spread at least 3 inches of topsoil, if required, before seeding. If topsoil is required, the subsoil should be serrated or disced to provide an interface.



- Apply seed and fertilization suitable for the area and season. The seed species and fertilization requirements must be developed by a professional or the local Soil Conservation Service Office.

#### MAINTENANCE:

- Inspect seeded areas after every rainfall event and at a minimum of monthly .
- Replace seed on any bare areas, or area showing signs of erosion as necessary.

### MULCHING

**DEFINITION:** Placement of material such as straw, grass, wood-chips, wood-fibers or fabricated matting over open area.

#### PURPOSE:

- Reduce velocity of storm water runoff.
- Reduce erosion by preventing rainfall directly hitting soil.
- Facilitate plant growth by holding seeds and fertilizer in place, retaining moisture and providing insulation against extreme temperature.

#### APPLICATION :

- Any exposed area to remain untouched longer than 14 days and that will be exposed less than 60 days (seed areas to be exposed in excess of 60 days).
- Areas that have been seeded.
- Stockpiled soil material.

#### LIMITATIONS:

- Anchoring may be required to prevent migration of mulch material.
- Down-gradient control may be required to prevent mulch material being transported to storm water system.

#### INSTALLATION:

- Rough area to revive mulch to create depressions that mulch material can settle into.
- Apply mulch to required thickness and anchor as necessary.

- Recommended Application Rates:
  - Straw: 2-3 bales/1000 square feet (90-120 bales/acre)
  - Wood Fiber: 25-30 pounds/1000 square feet (1000-1500 pounds/acre)
- Ensure material used is weed free and does not contain any constituent that will inhibit plant growth.

**MAINTENANCE:**

- Inspect mulched areas after every rainfall event and at a minimum of monthly .
- Replace mulch and any bare areas and re-anchor as necessary.
- Clean and replace down-gradient controls as necessary.

**Recommended Application Rates for Mulching.**

Material	Application	Depth	Comments
<u>Gravel:</u> Washed 3/4" to 1 1/2"	9 cu yd/1000 sq ft	3 inches	Good for traffic areas. Good for short slopes.
<u>Straw:</u> Air-Dried, free of seeds and coarse material.	2-3 bales/1000 sq ft	2 inches (Min.)	Subject to wind blowing. Tack down or keep moist.
<u>Wood Fiber Cellulose:</u> Free from growth inhibitors; dyed green	35 lb/1000 sq ft	1 inch (Min.)	For critical areas, double application rate; Limit to slopes <3% and < 150 feet

## **GEOTEXTILES**

**DEFINITION:** Matting or netting made biodegradable materials (such as Excelsior blanket, jute, wood fiber, straw, coconut, paper, or cotton) to reduce rainfall impact and surface erosion on disturbed soils.

**PURPOSE:**

- Reduce velocity of storm water runoff.
- Reduce erosion by preventing rainfall directly hitting soil.
- Facilitate plant growth by holding seeds, fertilizer, and mulch in place, retaining moisture and providing insulation against extreme temperature.
- Provide flexible roadway ditch lining to promote establishment of vegetative cover.

**APPLICATION:**

- Areas that have been seeded, fertilized and mulched with slopes that are steeper than 3:1.
- Stabilize vegetated roadway ditches while permanent vegetative cover becomes established.

**LIMITATIONS:**

- Effectiveness may be reduced drastically if the fabric is not properly selected, designed, or installed.
- Should not be placed on 1:1 slopes if they are to be covered with overlying material.
- Many synthetic geotextiles are sensitive to light and must be protected prior to installation.

**INSTALLATION:**

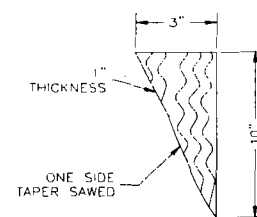
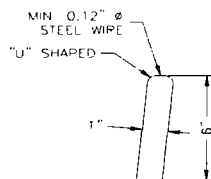
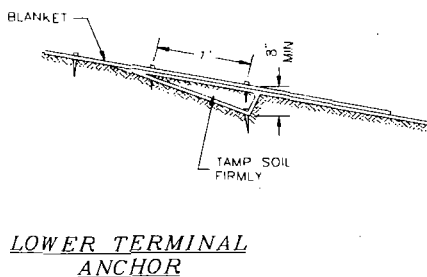
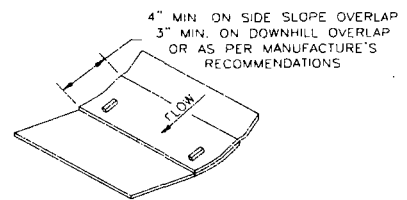
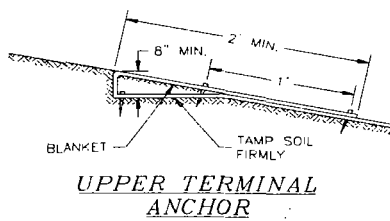
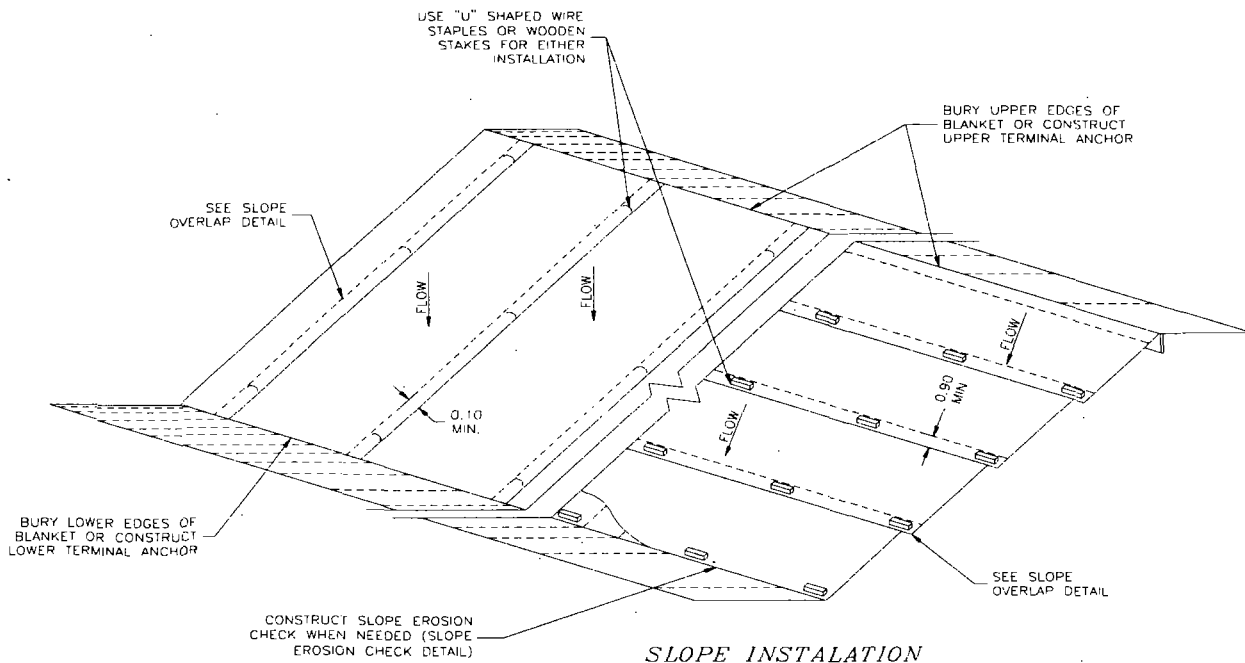
- Allow for an overlap of 4 inches on both sides of each roll and 36 inches at the ends of the roll.
- The fabric must extend beyond the edge of the exposed area at least 12 inches at the sides and 36 inches at the top and bottom.
- At the top of the area, bury the end of each roll in a trench at least 8 inches deep. The trench should then be backfilled and tamped.
- Staples should be driven perpendicularly into the slope face. Staples must be of 3/16" diameter (or heavier) steel wire. Allow for spacing of approximately 5 feet apart along the sides and center of each roll and not more than 12 inches apart along upper end of a roll or at the overlap of two rolls.
- The soil must be reasonably smooth. Fill and compact any rills and gullies. Remove any protruding rocks and other obstructions.
- Apply the individual rolls up and down the slope, from top to bottom--never along the contour.

- Make sure that the fabric makes uniform contact with the slope face underneath.  
No bridging of rills or gullies should be allowed.

**MAINTENANCE:**

- At a minimum, inspect geotextiles on a monthly basis, and after rain events greater than 0.5 inch of precipitation.
- Clean and replace down gradient controls as necessary.

# *GEOTEXTILES— TYPICAL DESIGN / LAYOUT*



## **SURFACE ROUGHENING**

**DEFINITION:** Rough preparation of working areas leaving depressions and uneven surface.

**PURPOSE:** Depressions trap water and sediment reducing erosion and facilitating establishment of vegetative cover.

**APPLICATION:**

- Surface roughening is appropriate for all construction that will not be receiving impervious cover within 14 days and that will be exposed less than 60 days (seed areas to be open in excess of 60 days).

**LIMITATIONS :**

- Will not withstand heavy rainfall.
- Slopes steeper than 2:1 (50% ) should be benched.

**CONSTRUCTION:**

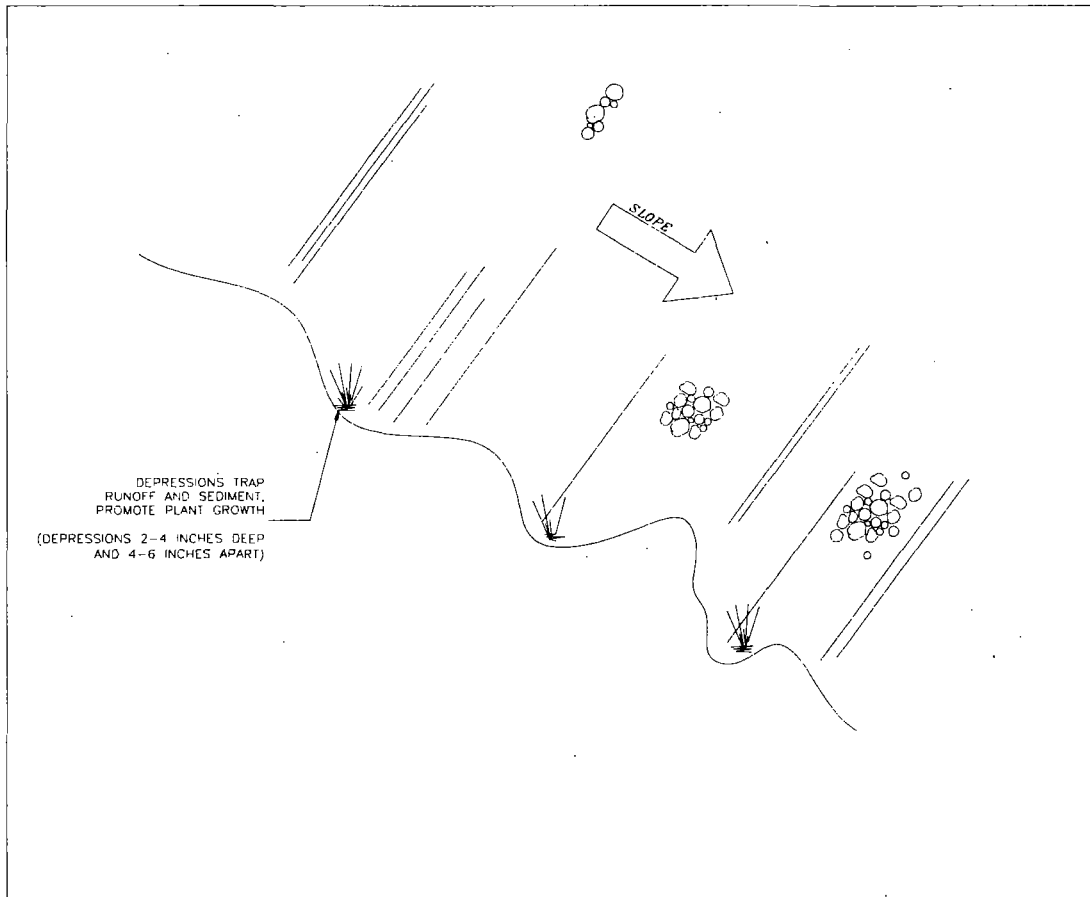
- Surface should be left in rough condition during initial earthwork activity.
- Surfaces that have become smoothed or compacted due to equipment traffic should be roughened by use of disks, spring harrows, teeth on front end loader, or similar, operating along the contour of the slope. Tracking (by crawler tractor driving up and down slope ) may also be used to provide depressions parallel to contours.
- Avoid compaction of soils during roughening as this inhibits plant growth and promotes storm water runoff. Limit tracked machinery to sandy soil.
- Seed or mulch areas to be exposed in excess of 60 days.
- Employ dust controls.

**MAINTENANCE:**

- Inspect following any storm event and at a minimum of weekly.
- If erosion in the form of rills (small waterways formed by runoff) is evident, perform machine roughening of area.
- For vegetated slopes reseed areas that are bare or have been reworked.

## *SURFACE ROUGHENING*

### *TYPICAL DESIGN LAYOUT*



## **SILT FENCE**

**DEFINITION:** A temporary sediment barrier consisting of filter fabric stretched across and secured to supporting posts and entrenched.

**PURPOSE:** To filter storm water runoff from up-gradient disturbed area and trap sediment on site.

**APPLICATION:**

- **Perimeter Control:** Place fence at down-gradient limits of disturbance.
- **Sediment Barrier:** Place fence at an offset distance from the toe of slope or soil stockpile required to contain anticipated sediment and storm water.
- **Protection of Existing Waterways:** Place fence at top of stream bank.
- **Inlet Protection:** Place fence surrounding catch basins.
- **Sediment Removal:** Place fence to capture sediment moving through roadway ditches.

**LIMITATIONS:**

- Recommended maximum drainage area of 0.5 acre per 100 feet of fence.
- Recommended maximum up-gradient slope length of 150 feet.
- Recommended maximum uphill grade of 2:1 (50%).
- Long-term ponding should not be allowed behind fence.

**INSTALLATION:**

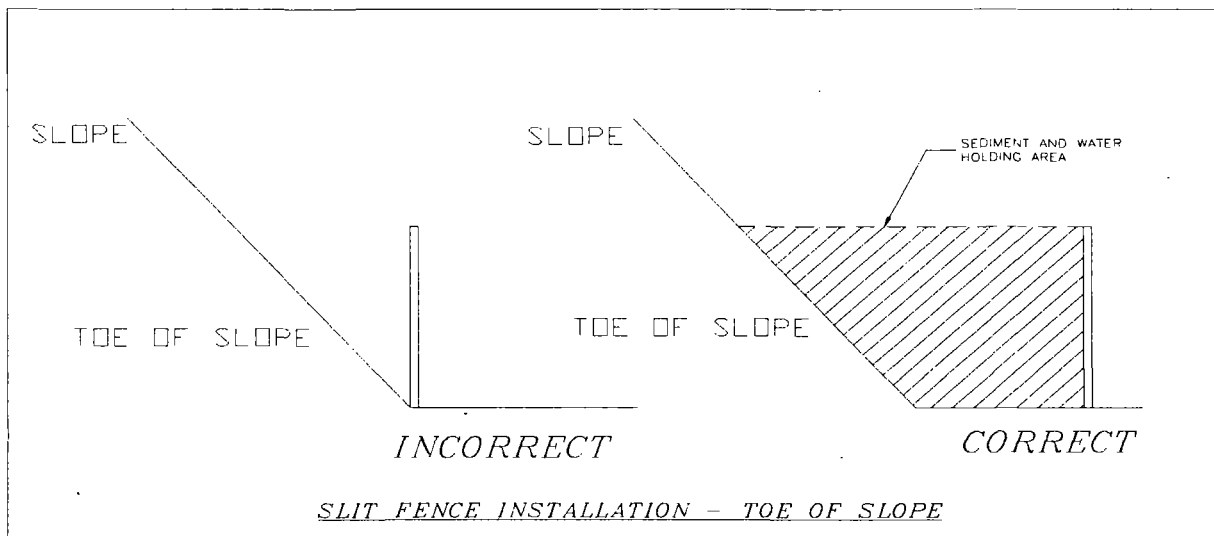
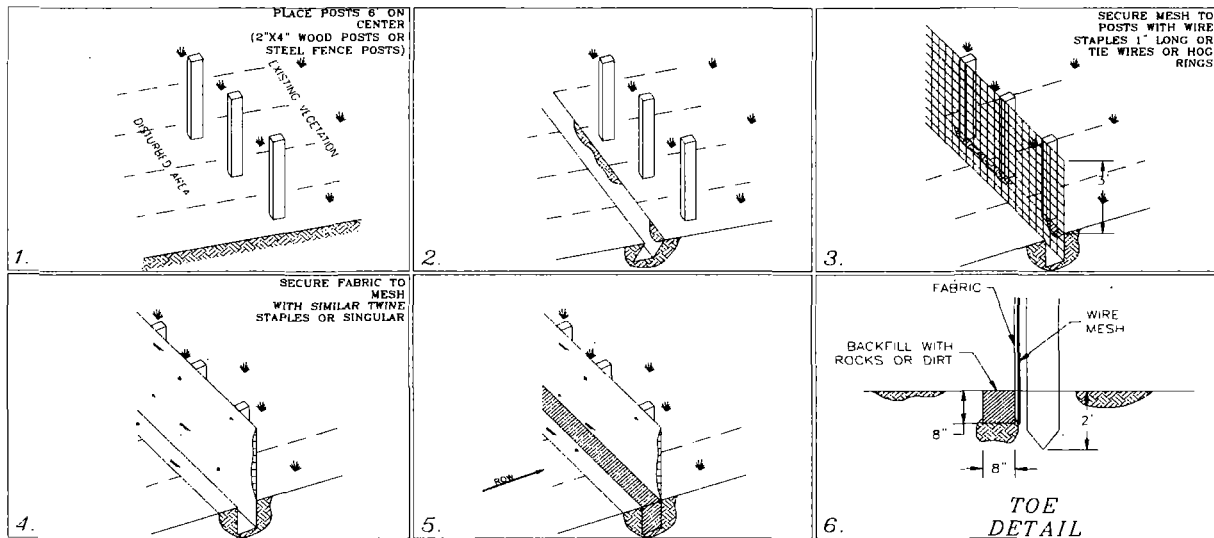
- Place posts 6 foot on center along contour (or use preassembled unit) and drive 2 feet (min.) into ground. Excavate an anchor trench (8 inches wide and 8 inches deep) immediately up-gradient of posts.
- Secure wire mesh (14 gage min. with 6 inch openings) to up slope side of posts. Attach with heavy duty wire staples 1 inch long, tie wires or hog rings.
- Cut fabric to required width, unroll along length of barrier and drape over barrier. Secure fabric to, mesh with twine, staples, or similar, with trailing edge extending into anchor trench.
- Backfill trench over filter fabric to anchor.

**MAINTENANCE :**

- Inspect immediately after any rainfall and at least daily during prolonged rainfall.
- Look for runoff bypassing ends of barriers or undercutting fence (repair immediately).
- Repair or replace damaged areas of the fence and remove accumulated sediment.
- Re-anchor fence as necessary to prevent shortcutting.
- Remove accumulated sediment when it reaches  $\frac{1}{2}$  the height of the fence.

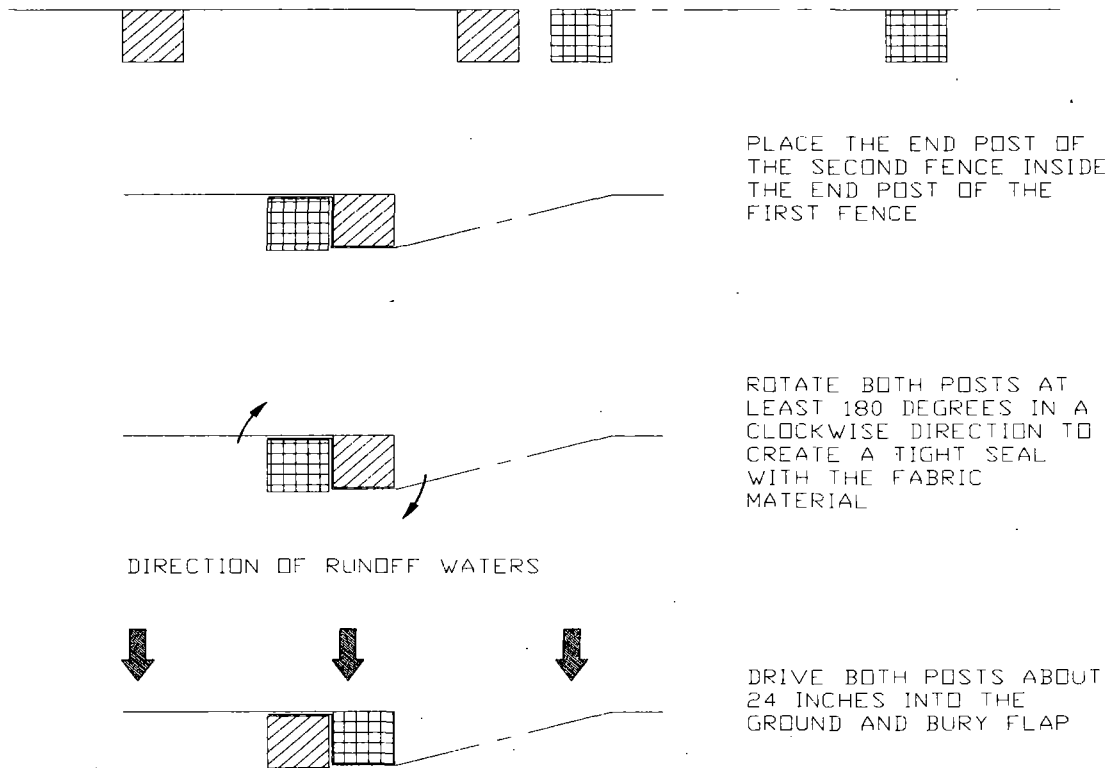


# *SILT FENCE TYPICAL DESIGN LAYOUT*



*SILT FENCE  
TYPICAL  
DESIGN LAYOUT*

*ATTACHING TWO SILT FENCES*



## **STRAW BALE BARRIER**

**DEFINITION:** Temporary sediment barrier consisting of a row of entrenched and anchored straw bales.

**PURPOSE:** To filter storm water runoff from up gradient disturbed area and trap sediment on site.

**APPLICATION:**

- Perimeter Control: Place barrier at down gradient limits of disturbance.
- Sediment Barrier: Place barrier at an offset distance from the toe of slope or soil stockpile required to contain anticipated sediment and storm water.
- Protection of Existing waterways: Place barrier at top of stream bank.
- Velocity Dissipation: Reduce velocities in roadway ditches.

**LIMITATIONS:**

- Recommended maximum drainage area of 0.5 acre per 100 foot barrier.
- Recommended maximum up gradient slope length of 150 feet.
- Recommended maximum uphill grade of 2:1 (50% ).

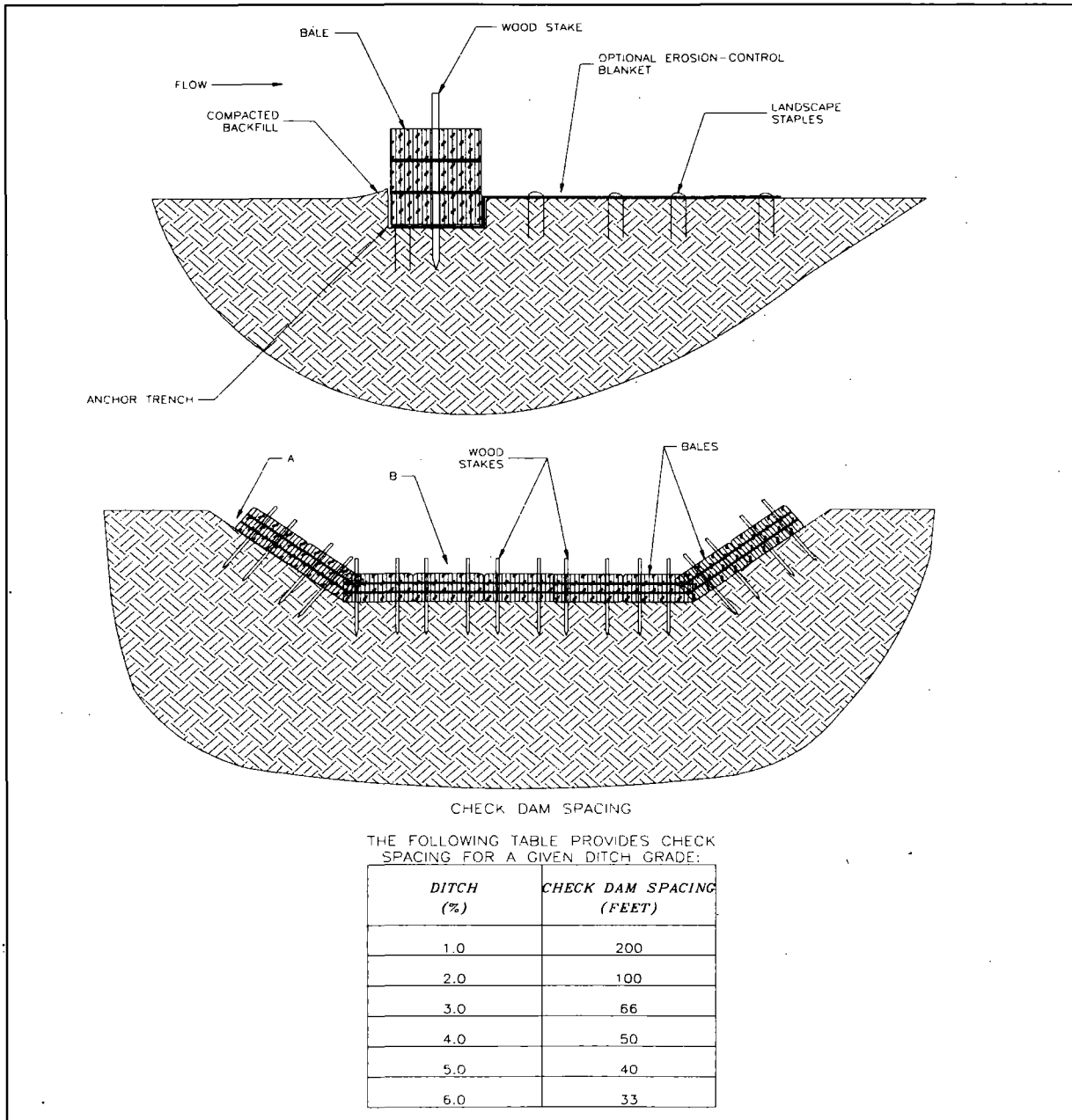
**INSTALLATION:**

- Excavate a 4-inch minimum deep trench along contour line, i.e. parallel to slope, removing all grass and other material that may allow underflow.
- Place bales in trench with ends tightly abutting, fill any gaps by wedging loose straw into openings.
- Anchor each bale with 2 stakes driven flush with the top of the bale. Extend Stakes 18 inches (min.) into the ground.
- Backfill around bale and compact to prevent piping, backfill on uphill side to be built up 4-inches above original ground at the barrier .
- In roadway ditches, straw bales should not be placed in such a way as to direct water around sides. Riprap should be placed around straw bale edges.

**MAINTENANCE:**

- Inspect immediately after any rainfall and at least daily during prolonged rainfall.
- Look for runoff bypassing ends of barriers or undercutting barriers.
- Repair or replace damaged areas of the barrier and remove accumulated sediment.
- Realign bales as necessary to provide continuous barrier and fill gaps.
- Re-compact soil around barrier as necessary to prevent piping.

# STRAW BALE CHECK DAM TYPICAL DESIGN LAYOUT



## **STABILIZED CONSTRUCTION ENTRANCE**

**DEFINITION:** A stabilized pad of crushed stone located where construction traffic enters or leaves the site from or to a paved surface.

**PURPOSE:** To reduce potential for vehicle tracking of sediment or flow of sediment onto a paved surface where it may runoff to a storm water collection system, waterway, or lake.

**APPLICATION:**

- At any point of ingress or egress at a construction site where adjacent traveled way is paved. Applies to all sites which require a Storm Water Pollution Prevention Permit and Erosion Control Permit.
- Any project having a duration of 3 months or more must instal filter fabric beneath the crushed stone to minimize sediment pumping into the crushed stone.

**LIMITATIONS:** Not listed.

**INSTALLATION:**

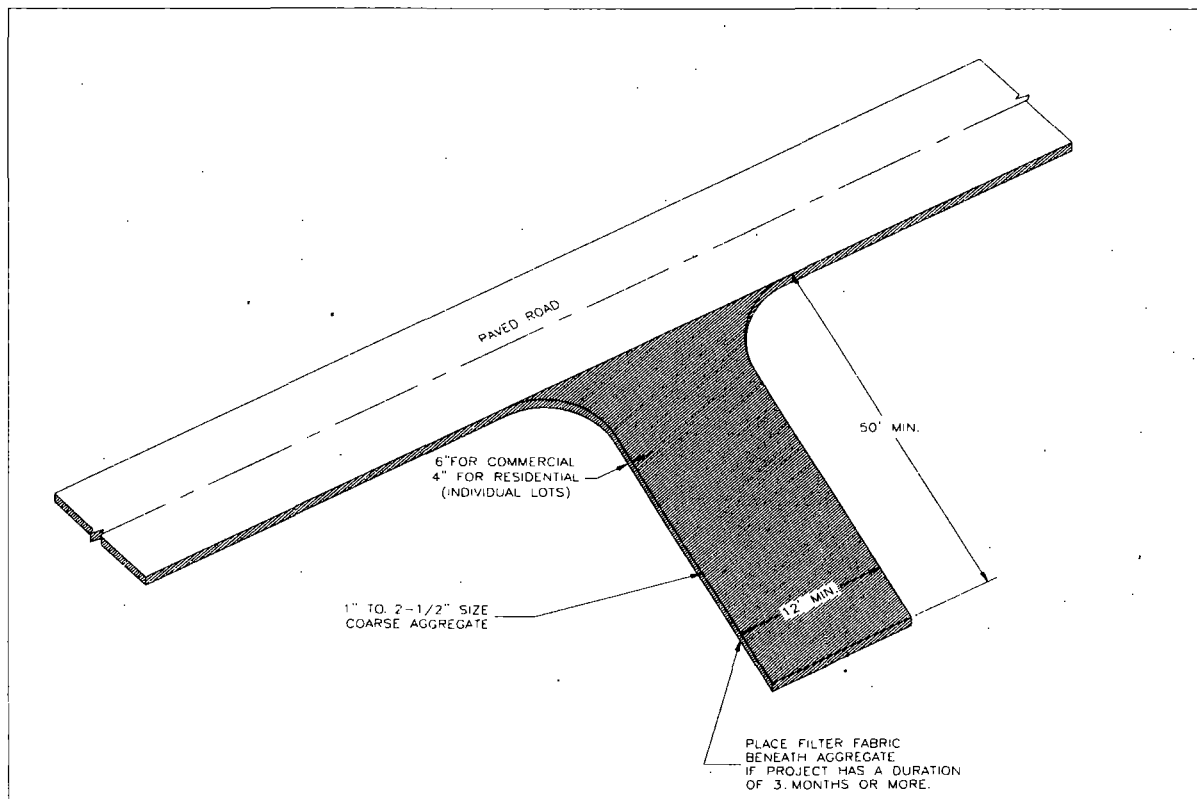
- Clear and grub area and grade to provide slope shown for driveway, or access/intersection. If adjacent to waterway, use a maximum slope of 2%.
- Compact subgrade and place filter fabric if required.
- Place coarse aggregate, 1 to 2 ½ inches size, to a minimum depth of 6 inches for commercial projects, and 4 inches for residential projects.

**MAINTENANCE:**

- Inspect daily for loss of gravel or sediment buildup.
- Inspect adjacent roadway for sediment deposit and clean by sweeping or shoveling.
- Repair entrance and replace gravel as required to maintain control in good working condition.
- Expand stabilized area as required to accommodate traffic, and off site street parking and prevent erosion at driveway.

## STABILIZED CONSTRUCTION ENTRANCE

### TYPICAL DESIGN LAYOUT



## **DIVERSION DITCH/DIKE**

**DEFINITION:** A temporary sediment barrier and storm water conveyance consisting of an excavated channel and compacted earth ridge.

**PURPOSE:** To protect down-gradient areas from sedimentation and erosion by diverting runoff to a controlled discharge point.

**APPLICATION:**

- Construct along the top of construction slope to intercept up-gradient runoff.
- Construct along the toe of construction slope to divert sediment laden runoff.
- Construct along midpoint of construction slope to intercept runoff and channel to a controlled discharge point.
- Construct around base of soil stockpiles to capture sediment.
- Construct around perimeter of disturbed areas to capture sediment.

**LIMITATIONS:**

- Recommended maximum drainage of 5 acres.
- Recommended maximum side slopes of 2:1 (50%).
- Recommended maximum slope on channel of 1%.

**INSTALLATION:**

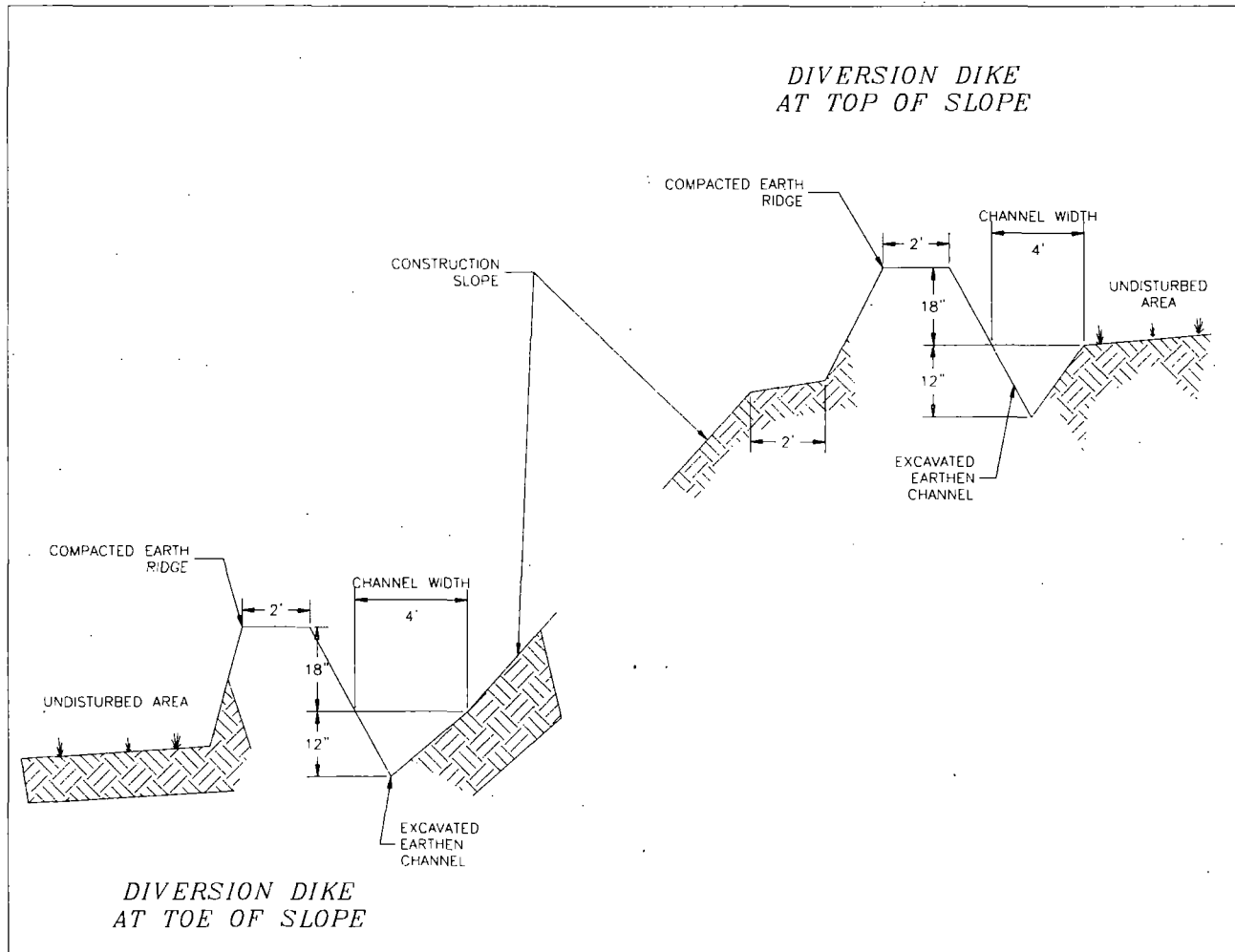
- Clear and grub area for ditch/dike construction.
- Excavate channel and place soil on down gradient side.
- Shape and machine compact excavated soil to form ditch/ridge.
- Place erosion protection (Riprap, mulch, appropriate geotextiles) at outlet.
- Stabilize channel and ridge as required with mulch, gravel or vegetative cover.

**MAINTENANCE:**

- Inspect immediately after any rainfall and at least daily during prolonged rainfall.
- Look for runoff breaching dike or eroding channel or side slopes.
- Check discharge point for erosion or bypassing of flows.
- Repair and stabilize as necessary.
- Inspect daily during vehicular or construction equipment activity on slope, check for and repair any traffic damage.

# DIVERSION DIKE

## TYPICAL DESIGN LAYOUT





**FRONTIER**

A T E S  
NAME HERNANDEZ/KATHI  
DATE 21MAY  
PQTV F9 20012543092  
FLIGHT 725  
ET2 422 7344830687

GATE

SEAT

26

8D

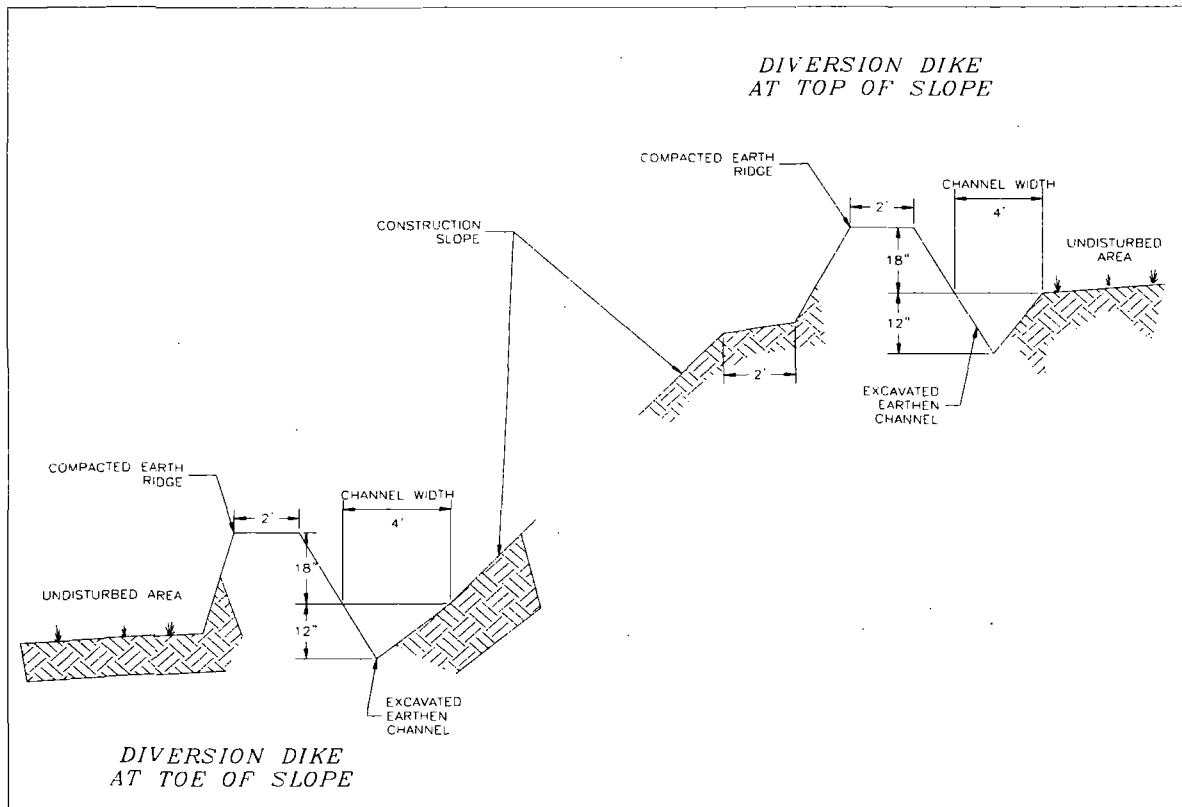
SEQ141 DLP DCA 0600I

ARR DEN 0750I

**BOARDING TIME 525P**

## DIVERSION DIKE

### TYPICAL DESIGN LAYOUT



## **WATER BAR**

**DEFINITION:** A constructed drainage feature that diverts water off unpaved roads or trails to a controlled discharge point.

**PURPOSE:** To prevent water from ponding and/or flowing on/or along an unpaved road or trail by diverting runoff to a controlled discharge point.

**APPLICATION:**

- Construct along roads/trails to intercept up-gradient runoff and prevent rills from forming on fill slopes.
- Construct in low areas where water ponding is likely to occur to divert water off of the road/trail surface.
- Construct where erosion problems are occurring due to uncontrolled runoff.

**LIMITATIONS:**

- Discharge point should be stable and not sensitive to increases in runoff.
- Unfiltered discharges should not be directed directly into natural waterways.
- Waterbars must be appropriately sized for specific traffic types and levels of use.

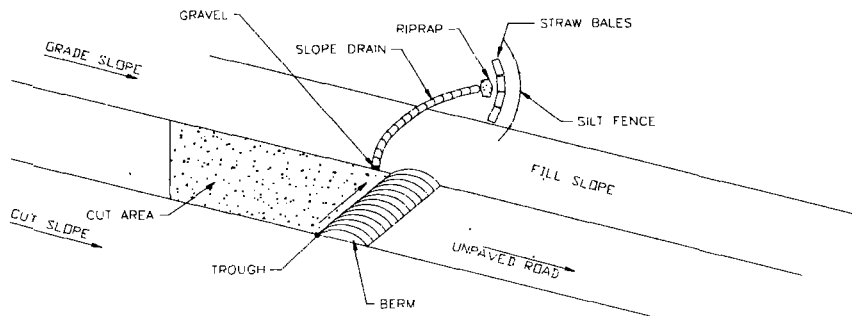
**INSTALLATION:**

- Location and frequency should be based on road slopes, runoff patterns, and topography.
- Determine discharge point and appropriate discharge method (slope drain, vegetated swale, rip rapped chute, or storm drain).
- Excavate trough and/or construct berm with fill.
- Compact the fill material.
- Construct discharge point.
- Use straw bales, silt fencing, gravel check dams, excavated sediment traps, or existing vegetation to filter the discharge as necessary .

**MAINTENANCE:**

- Inspect immediately after any rainfall and at least daily during prolonged rainfall.
- Remove sediment as necessary .
- Inspect for runoff breaching water bar or eroding at/or below the discharge point.
- Repair vehicle ruts on the top of the berm and stabilize as necessary.

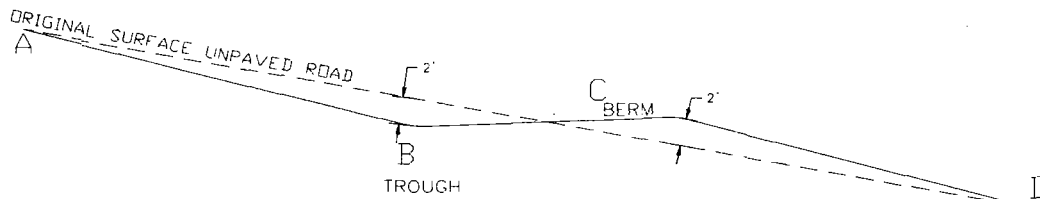
# WATER BAR - PLAN VIEW



## #1 WATER BAR - CROSS SECTION

BERM METHOD

0 5



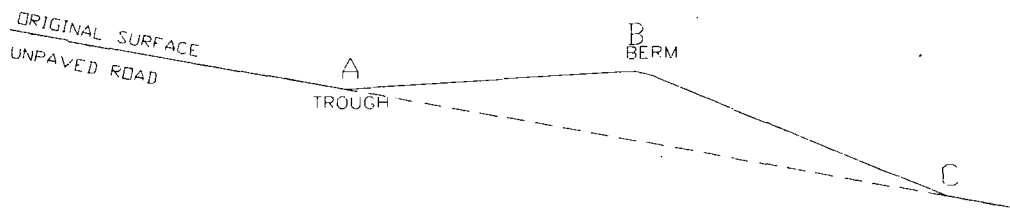
SEGMENT	SLOPE DISTANCE
A-B	25'
B-C	15'
C-D	15'

CUT AND FILL METHOD

## #2 WATER BAR - CROSS SECTION

BERM METHOD

0 3



SEGMENT	SLOPE DISTANCE
A-B	8'
B-C	16'

BERM METHOD

## **STORM DRAIN INLET PROTECTION**

**DEFINITION:** Concrete block, filter cloth, and gravel filter placed over inlet to storm drain system.

**PURPOSE:** Reduce sediment discharge to storm drain system by filtering storm Water flows and reducing flow velocities allowing deposition of sediment.

**APPLICATION:**

- Construct at storm drain inlets in paved or unpaved areas where up-gradient area is to be disturbed by construction activities.

**LIMITATIONS:**

- Recommended for maximum drainage of one acre.
- Excess flows may bypass the inlet requiring down gradient controls.
- Ponding will occur at inlet.

**INSTALLATION:**

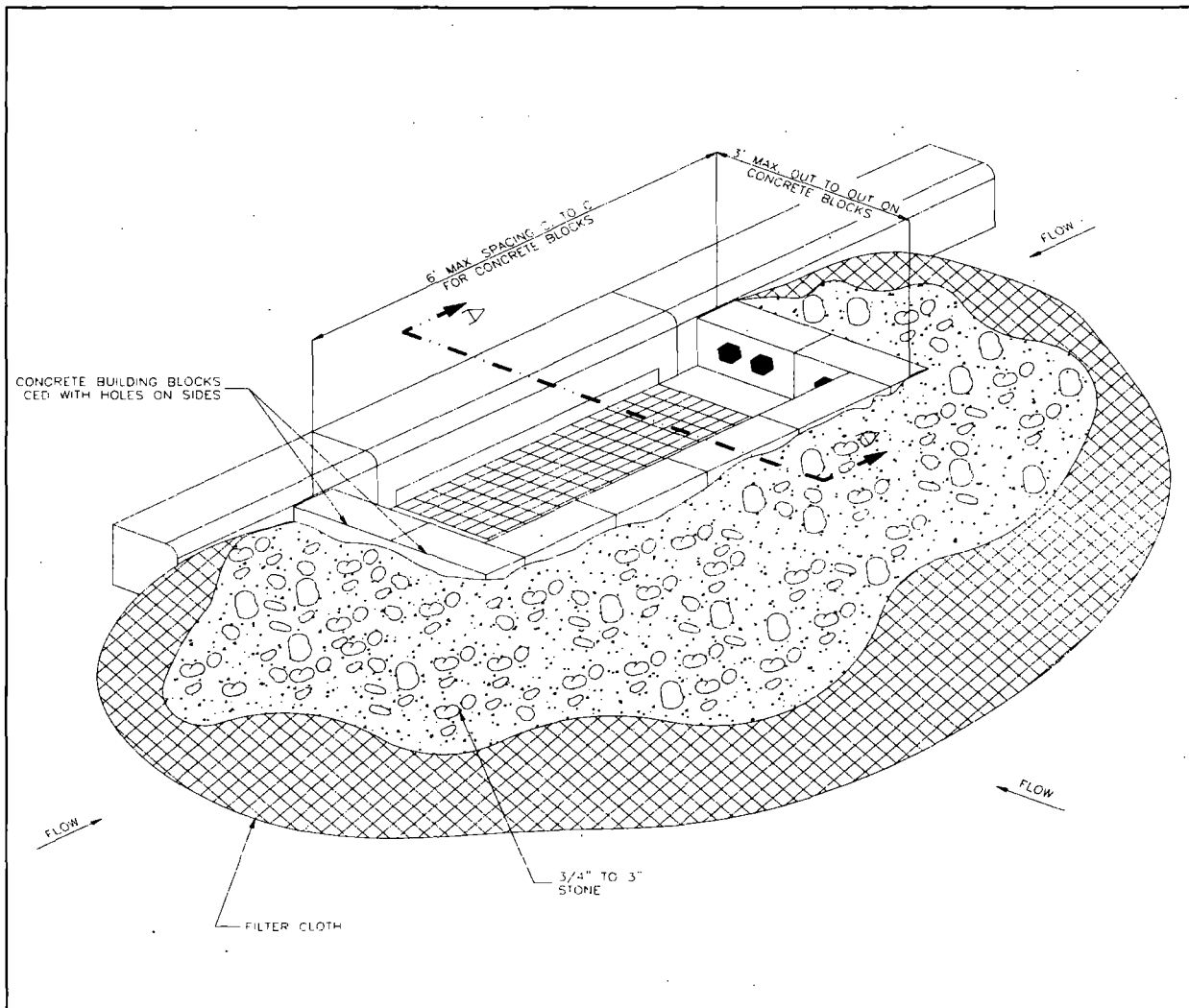
- Place wire (with ½ inch openings) over the inlet extending 12-inches past inlet opening. Place filter fabric over mesh.
- Place concrete blocks around the inlet with openings facing outward. Stack blocks to minimum height of 12-inches and a maximum height of 24-inches.
- Place wire mesh around outside of blocks.
- Place gravel (¾ inch to 3 inches) around blocks.

**MAINTENANCE:**

- Inspect inlet protection after every large storm event and at a minimum of once monthly.
- Remove sediment accumulated when it reaches 4-inches in depth.
- Replace filter fabric and clean or replace gravel if clogging is apparent.

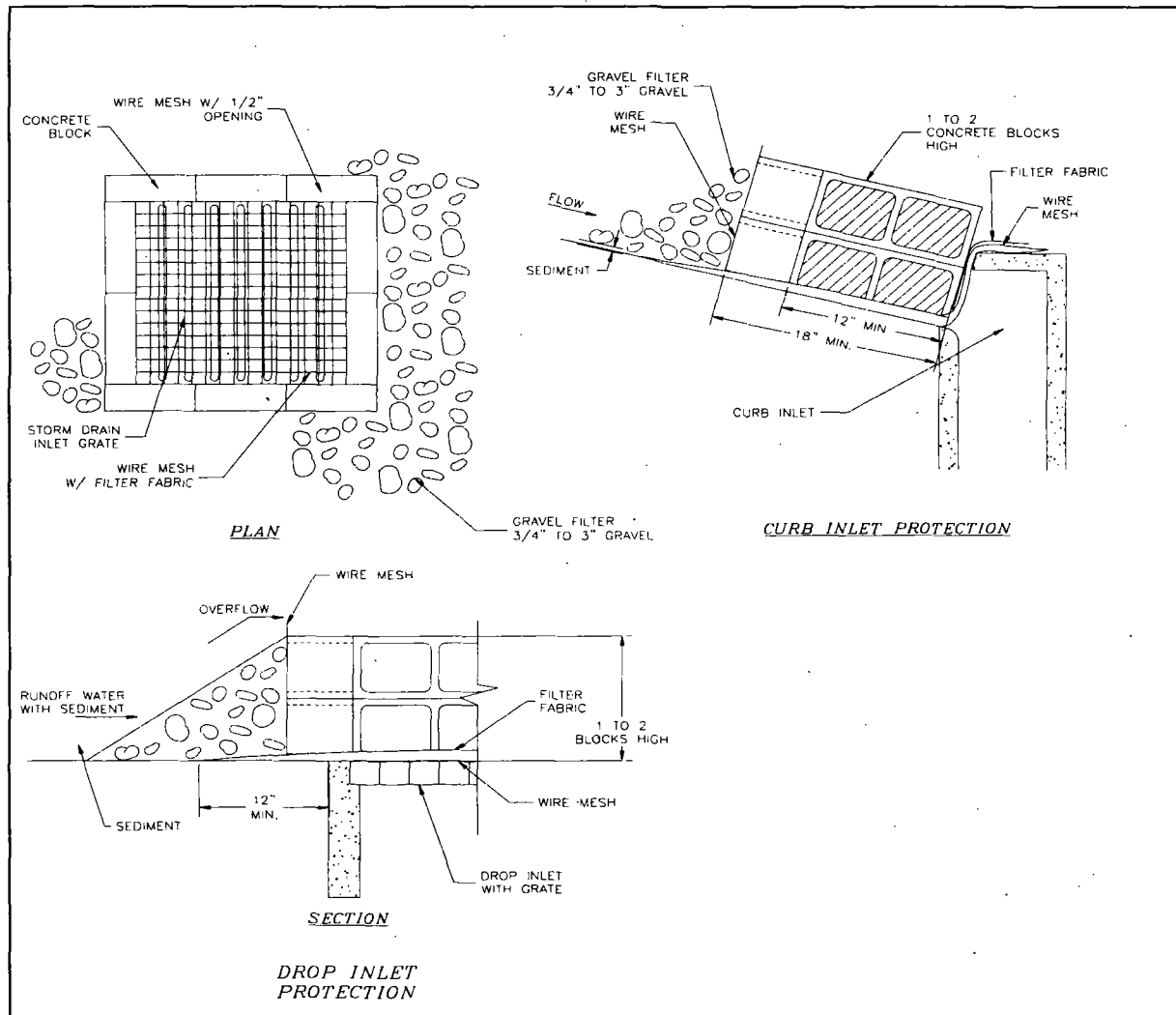
## INLET PROTECTION

### TYPICAL DESIGN LAYOUT

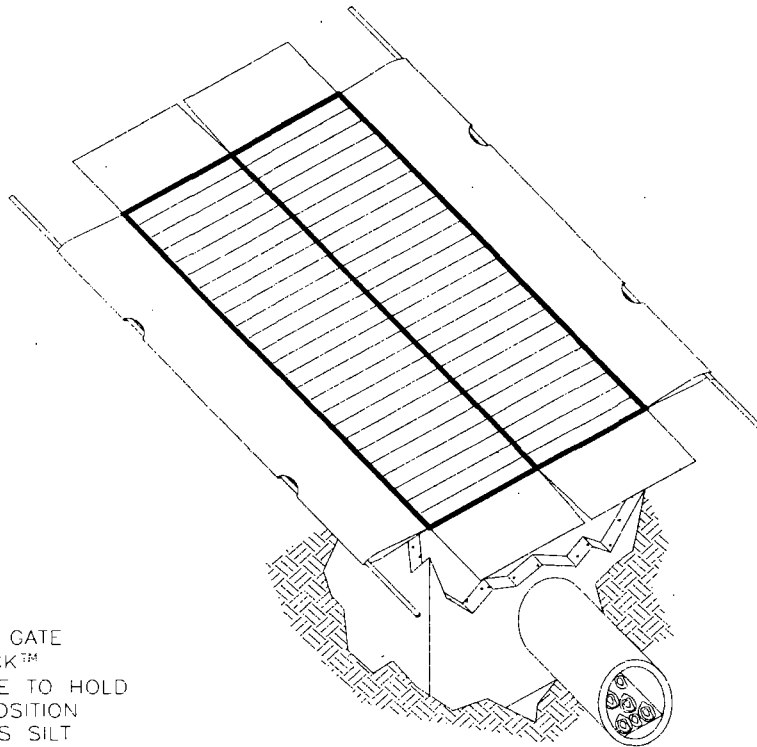


## INLET PROTECTION

### TYPICAL DESIGN LAYOUT



# *SILT*SACK™



REMOVE DRAIN GATE  
 INSERT SILTSACK™  
 REPLACE GRADE TO HOLD  
 SILTSACK IN POSITION  
 SILTSACK TRAPS SILT  
 REMOVE FILLED SILTSACK  
 (WITH FRONT-LOADER OR OTHER EQUIPMENT)  
 LIFT DUMP STRAPS  
 CLEAN AND REUSE OR  
 DISCARD AND REPLACE  
 SIZED TO FIT ANY SIZE OR SHAPE CATCH BASIN  
 ALL SEAMS DOUBLE STICHED  
 PERMEABILITY— REGULAR FLOW SILTSACK —40 GAL./MIN /FT.  
 HIGH FLOW SILTSACK—200GAL./MIN /FT.  
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 ATLANTIC CONSTRUCTION FABRICS, INC.  
 1801-A WILLIS ROAD  
 RICHMOND VA 23237



## **GRAVEL CHECK DAMS**

**DEFINITION:** Small temporary dam constructed across dry drainage path (i.e. not in live streams).

**PURPOSE:** To reduce erosion of drainage path by reducing velocity of flow and by trapping sediment and debris.

**APPLICATION:**

- Temporary drainage paths.
- Permanent drainage ways not yet stabilized.
- Existing drainage paths receiving increased flows due to construction.

**LIMITATIONS:**

- Maximum recommended drainage area is 10 acres.
- Maximum recommended height is 24".
- Do not use in running stream.

**INSTALLATION:**

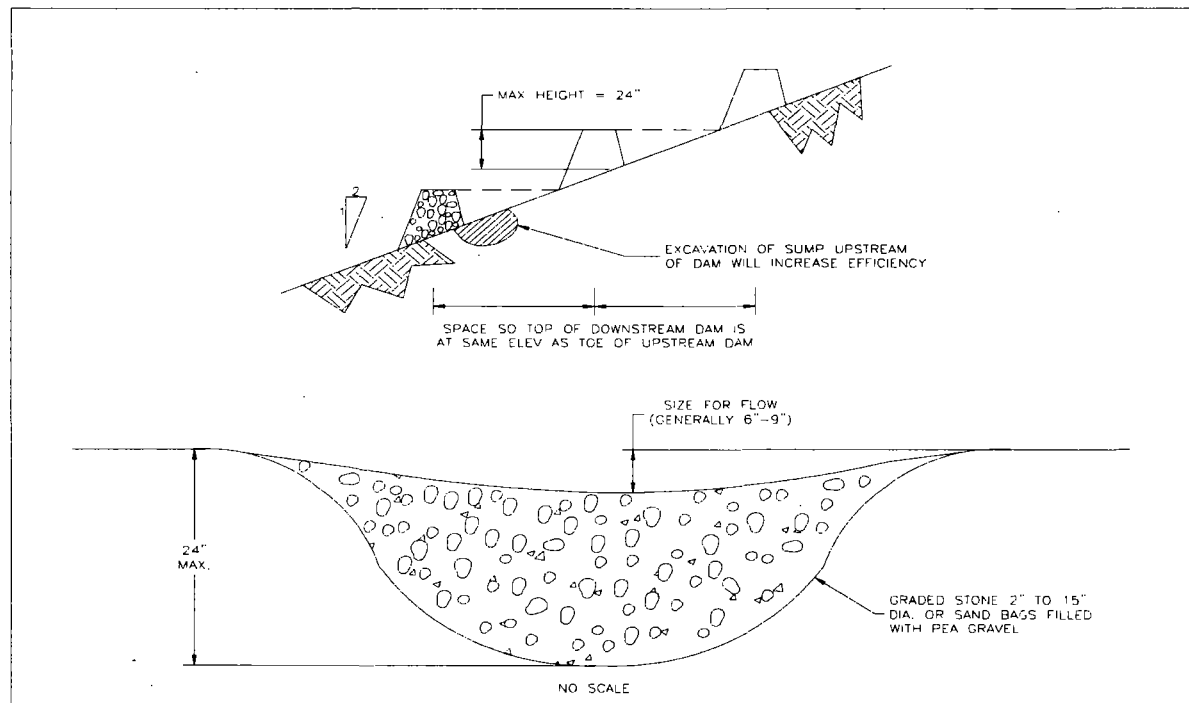
- Prepare location of dam by removing any debris and rough grading any irregularities in channel bottom.
- Place rocks by hand or with appropriate machinery, do not dump.
- Construct dam with center lower to pass design flow.
- Construct 50% side slopes on dam.

**MAINTENANCE:**

- Inspect dams daily during prolonged rainfall, after each major rain event and at a minimum of once monthly.
- Remove any large debris and repair any damage to dam, channel, or side slopes.
- Remove accumulated sediment when it reaches one half the height of the dam.

# GRAVEL CHECK DAMS

## TYPICAL DESIGN LAYOUT



DITCH GRADE (%)	CHECK DAM SPACING (FEET)
5.0	60
6.0	50
7.0	43
8.0	36
9.0	33
10.0	30

## **STRAW BALE CHECK DAMS**

**DEFINITION:** Small temporary dam constructed across dry drainage path (i.e. not in live streams).

**PURPOSE:** To reduce erosion of drainage path by reducing velocity of flow and by trapping sediment and debris.

**APPLICATION:**

- Temporary drainage paths.
- Permanent drainage ways not yet stabilized.
- Existing drainage paths receiving increased flows due to construction.

**LIMITATIONS:**

- Maximum recommended drainage area is 10 acres.
- Sufficient number of bales are required to force runoff over the flow line.
- Do not use in ditches with slopes of 6% or more. For ditches with slopes over 6%, use rock check dams.
- Do not use where high flows are expected.
- Do not use directly in front of a culvert outlet.
- Do not use in running stream.

**INSTALLATION:**

- Prepare location of dam by removing any debris and rough grading any irregularities in channel bottom.
- Bales must be free of weeds declared noxious by the State of Utah, Department of Agriculture.
- Excavate a vertical trench perpendicular to the ditch flow line the length of the straw bale dam that is 6 inches deep, and 1.5 time the width of the bale.
- Place bales in the trench, making sure that they are tightly butted against each other, and the excavated trench on the downstream side.
- Place two stakes through each bale, approximately 8 inches from each end and drive at least 18 inches into the ground.
- Construct dam with center lower to pass design flow.
- Place and compact the excavated material in the remaining trench area on the upstream side. The compacted soil should be no more than 4 inches deep and extend upstream no more than 24 inches.
- Use downstream scour apron where required.

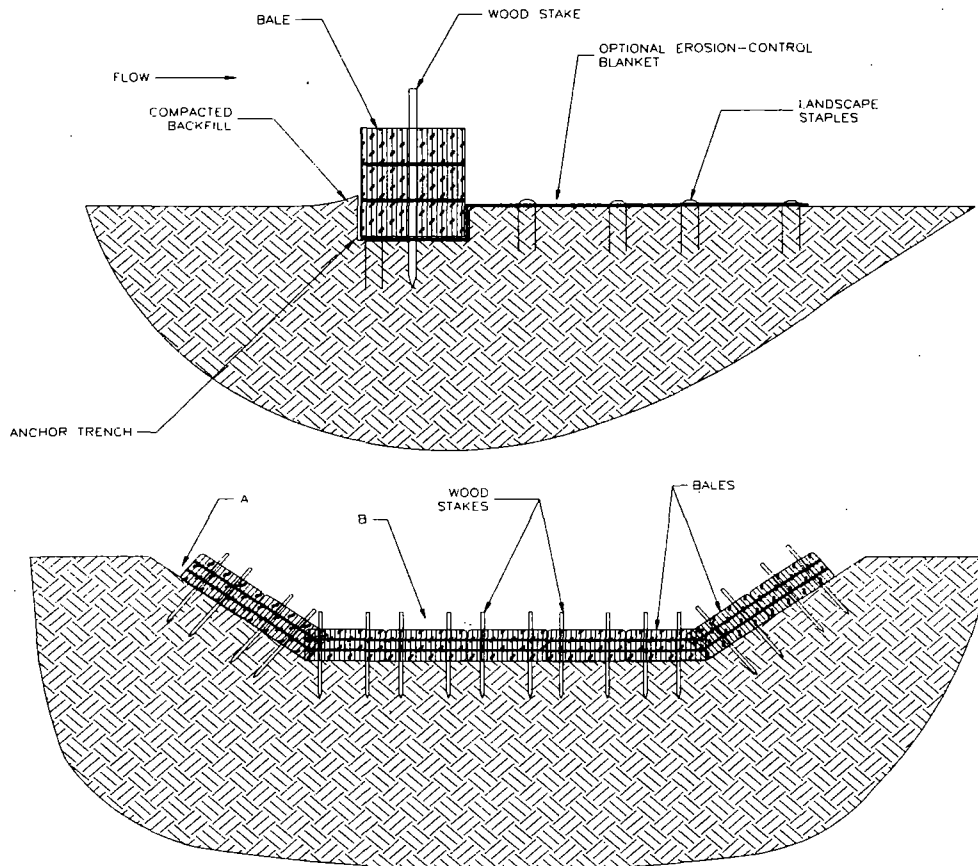
**MAINTENANCE:**

- Inspect dams daily during prolonged rainfall, after each major rain event and at a minimum of once monthly.
- Remove any large debris and repair any damage to dam, channel, or side slopes.

- Remove accumulated sediment when it reaches one half the height of the dam.

## STRAW BALE CHECK DAM

### TYPICAL DESIGN LAYOUT



#### CHECK DAM SPACING

THE FOLLOWING TABLE PROVIDES CHECK  
SPACING FOR A GIVEN DITCH GRADE:

DITCH (%)	CHECK DAM SPACING (FEET)
1.0	200
2.0	100
3.0	66
4.0	50
5.0	40
6.0	33

## SLOPE DRAIN

**DEFINITION:** A device used to carry concentrated runoff from the top to the bottom of a slope.

**PURPOSE:**

- Convey runoff from offsite around a disturbed portion of the site.
- Drain saturated slopes that have the potential for soil slides.

**APPLICATION:**

- Use on cut or fill slopes before permanent storm water drainage structures have been installed.
- Use where diversion ditches or other diversion measures have been used to concentrate flows.
- Use on any slopes where concentrated runoff crossing the face of the slope may cause gullies, channel erosion, or saturation of slide-prone soils.
- Use as an outlet for a natural drainage way.

**LIMITATIONS:** Not suitable for drainage areas greater than 10 acres.

**INSTALLATION:**

- The slope drain design should handle the peak runoff for the 10-year 24-hour storm. Typical relationships between area and pipe diameter are shown below:

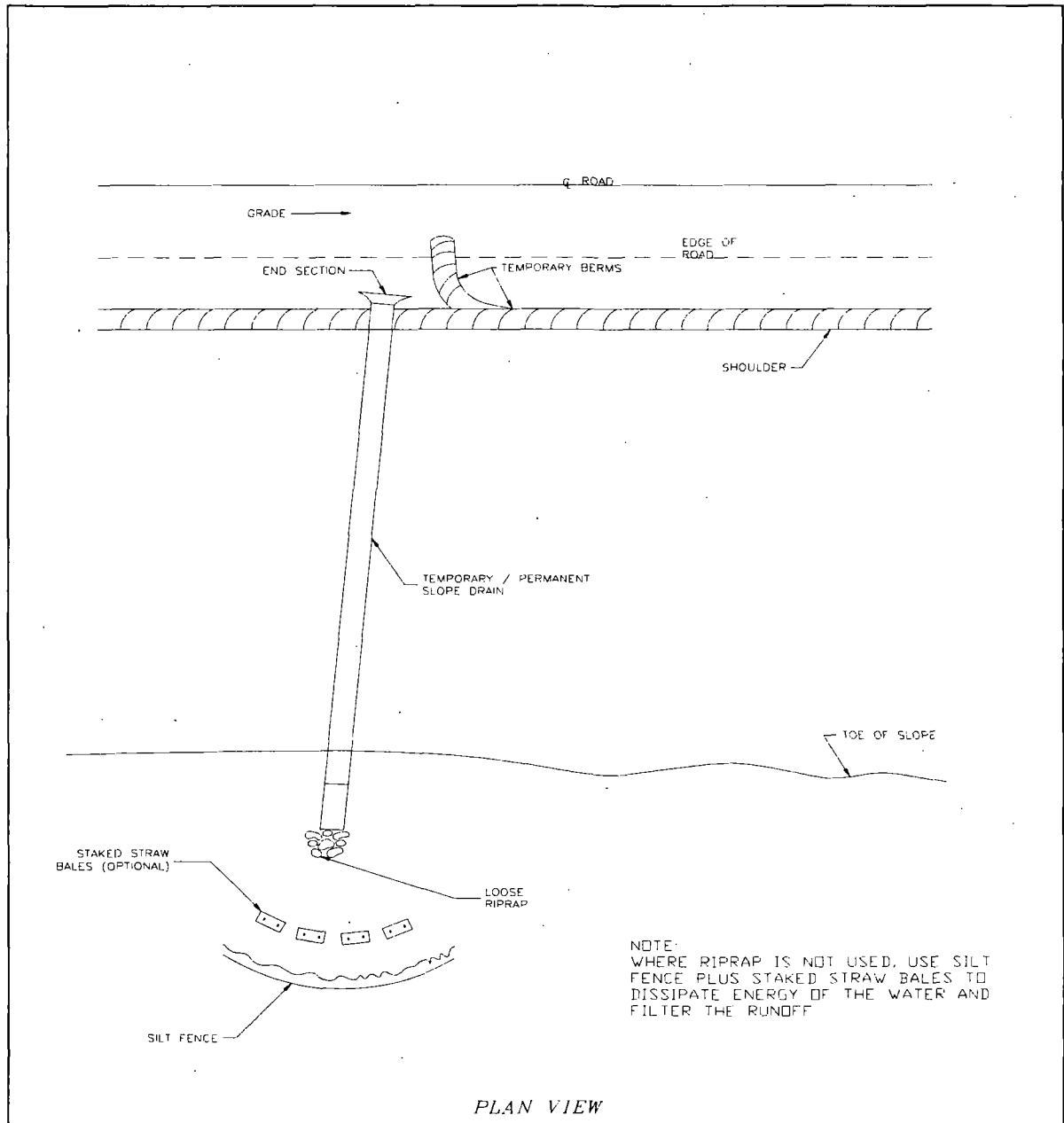
Maximum Drainage Area (Acres)	Pipe Diameter (inches)
0.50	12
0.75	15
1.00	18

- Place slope drain on undisturbed or well-compacted soils.
- Place filter cloth under the inlet, extend it to 3 to 6 feet in front of the inlet, and key it in 6 to 8 inches on all sides to prevent erosion. A 6 to 8 inches metal toe plate may also be used for this purpose.
- Securely stake the drain pipe to the slope at intervals of 10 feet or less, using grommets.
- Make sure that all slope drain sections are securely fastened together and have watertight fittings.
- Extend the pipe beyond the toe of the slope and discharge at a non-erosive velocity into a stabilized area or to a sediment trap. Use riprap outlet protection if necessary.

**MAINTENANCE:**

- Inspect the slope drain regularly and after every storm. Check to see if water is bypassing the inlet or undercutting the inlet or pipe. If necessary , install head walls or sandbags to prevent bypass flow.
- Check for erosion at the outlet point and check the pipe for breaks or clogs.

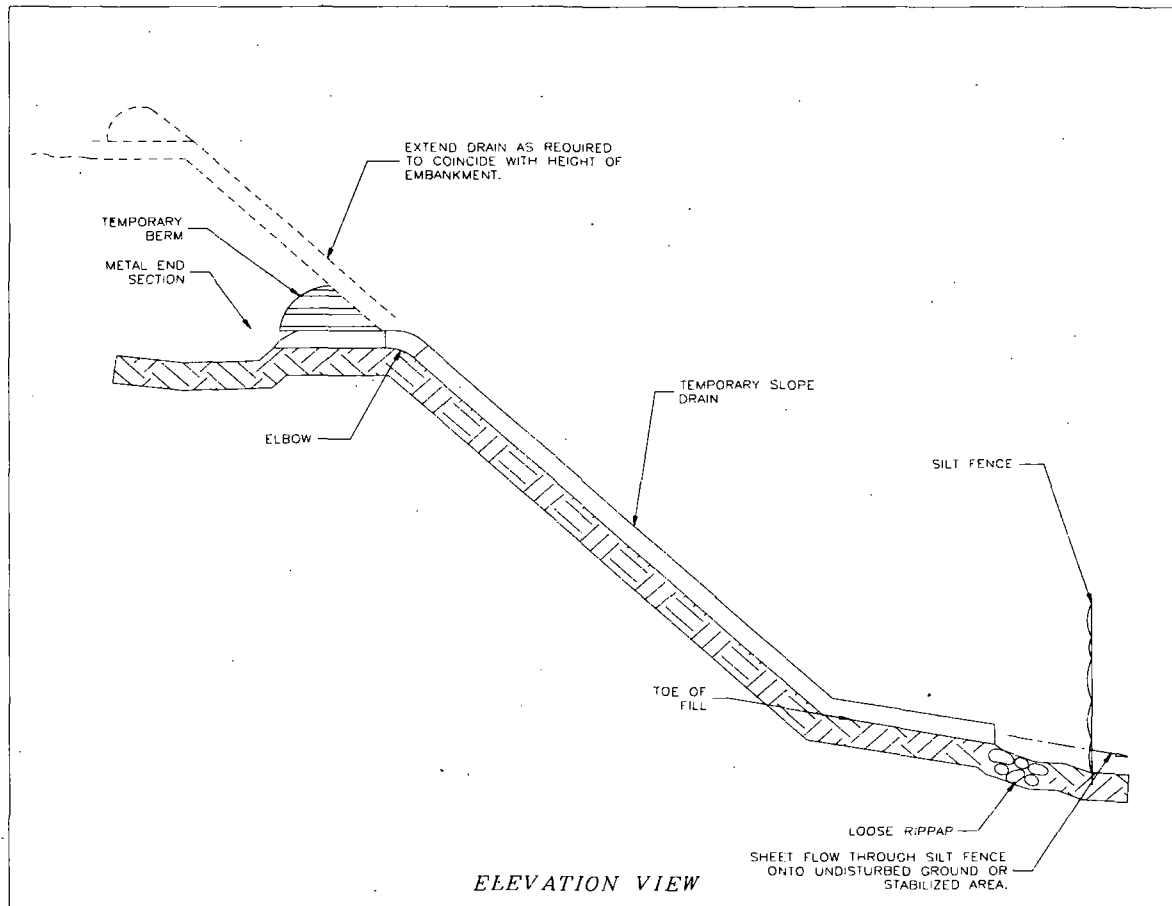
# *SLOPE DRAIN TYPICAL DESIGN LAYOUT*





## *SLOPE DRAIN*

### *TYPICAL DESIGN LAYOUT*



## **OPEN CHUTE DRAIN**

**DEFINITION:** An excavated channel placed across disturbed slopes used to protect exposed slopes by intercepting runoff and directing it to a stabilized outlet or sediment-trapping device.

**PURPOSE:** Convey runoff over disturbed soil without causing further erosion of the slope.

**APPLICATION:**

- Used on cut and fill slopes as a permanent or temporary storm water drainage structure.
- Used where diversion ditches or other diversion measures have been used to concentrate flows.

**LIMITATIONS:**

- Should be sized based on anticipated runoff, sediment loading and drainage area size.
- May require temporary slope drain until final grade is established and open chute drain is constructed.
- Recommended maximum slope of 2:1 (50%).
- Recommended minimum slope of 20:1 (5%).

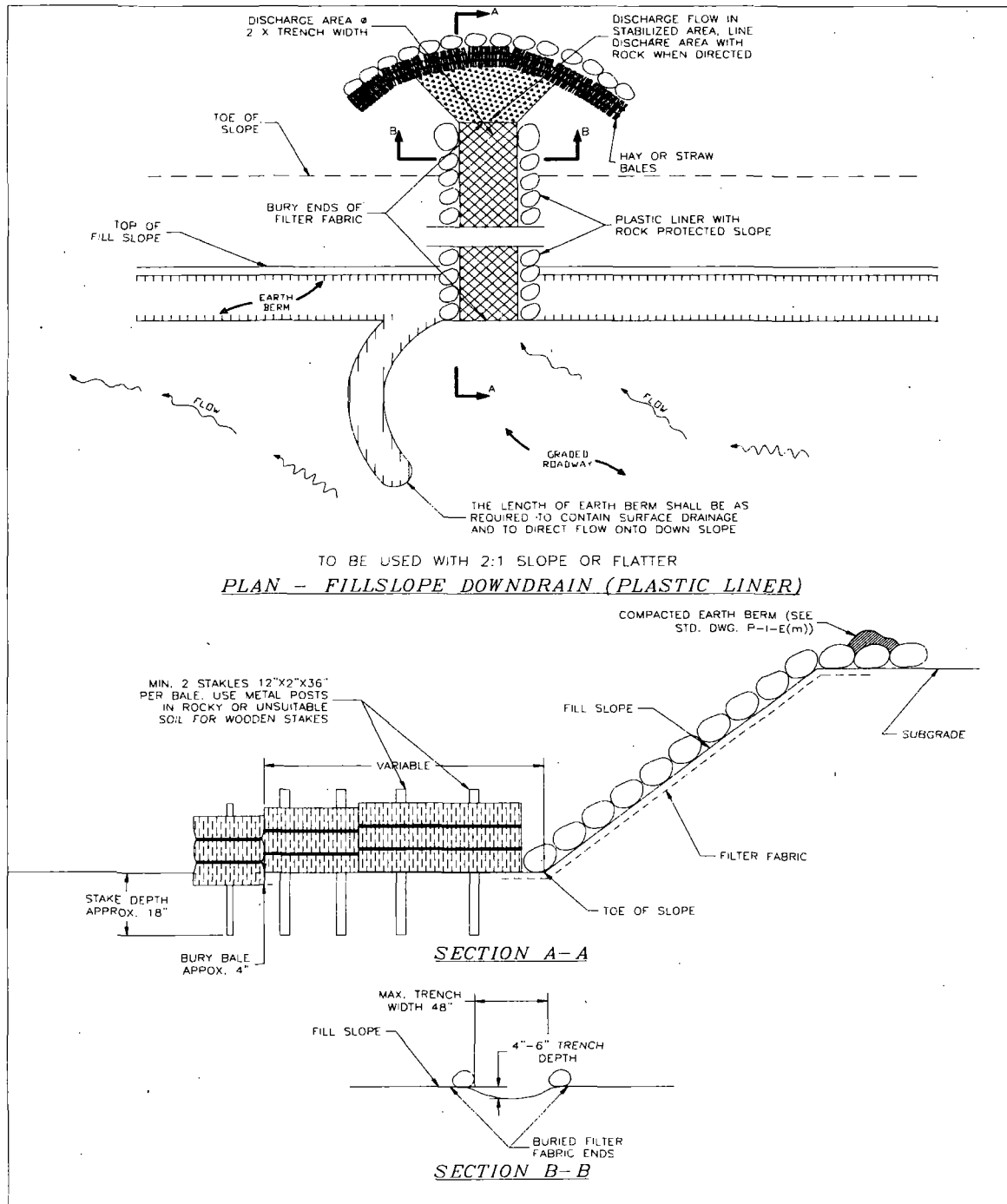
**INSTALLATION:**

- Detail design is required.
- Implementation of energy dissipaters at the outlet end to protect against scour.
- The elevation of the top of the lining of the inlet structure must not be higher than the lowest diversion dike(s) or other devices that direct flow to the chute.
- Design with adequate capacity to convey the 50-year , 6-hour storm.
- Compact some soil around the inlet to ensure that a good bond is attained at the interface of the structure and diversion dikes and to prevent piping failure. Place Rip Rap if required.

**MAINTENANCE:**

- Inspect after major storms. Look for piping failure at the interface of the inlet and adjoining diversion dike(s) or berm(s).
- Repair any damage promptly .

## OPEN CHUTE DRAIN TYPICAL DESIGN LAYOUT



## **ROCK-LINED (RIP RAP) DITCHES**

**DEFINITION:** A channel or ditch lined with rocks to prevent erosion. May be used as a temporary or permanent control.

**PURPOSE:** Convey runoff without causing erosion of the a ditch or channel.

**APPLICATION:**

- Used in ditches or channels which may or may not have continuous flow.
- Used along roadways where the ditch or channel does not jeopardize the Clear Zone.

**LIMITATIONS:**

- Should be sized based on anticipated runoff, sediment loading and drainage area size.
- Recommended maximum slope of 2:1 (50%).
- Ditches or Channels having slopes greater than 8% must utilize geotextiles beneath the rock.
- Minimum Rock size shall be 6". The gradation shall be determined by the detailed design.

**INSTALLATION:**

- Detail design is required.
- Implementation of energy dissipaters at the outlet end to protect against scour.
- Design temporary ditches with adequate capacity to convey the 50-year , 6-hour storm. Design permanent ditches per Summit County Standards.
- Excavate ditch or channel to the designed cross section and grade. The ditch or channel side slope may be no steeper than 2:1.
- Place geotextiles (if required) along the full width of the excavated ditch or channel. Be sure to overlap the material as required in the manufacturers guidelines.
- Place the rock by machine, or by hand as required.

**MAINTENANCE:**

- Inspect after major storms. Look for undermining failures.
- Repair any damage promptly .

## **GRASSED/MATTED SWALES**

**DEFINITION:** A channel or ditch lined with vegetated matts to prevent erosion. May be used as a temporary or permanent control.

**PURPOSE:** Convey runoff without causing erosion of the a ditch or channel.

**APPLICATION:**

- Used in ditches or channels which do not have continuous flow.
- Used along roadways where the ditch or channel is used to convey storm water.

**LIMITATIONS:**

- Should be sized based on anticipated runoff, sediment loading and drainage area size.
- Recommended maximum slope of 20:1 (5%).

**INSTALLATION:**

- Detail design is required.
- Implementation of energy dissipaters at the outlet end to protect against scour.
- Design temporary ditches with adequate capacity to convey the 50-year , 6-hour storm. Design permanent ditches per Summit County Standards.
- Excavate ditch or channel to the designed cross section and grade. The ditch or channel side slope may be no steeper than 3:1.
- Place matt along the full width of the excavated ditch or channel. Be sure to overlap the material if required in the manufacturers guidelines.

**MAINTENANCE:**

- Inspect after major storms. Look for undermining failures.
- Repair any damage promptly .

## **TEMPORARY EXCAVATED SEDIMENT TRAP**

**DEFINITION:** A small temporary containment area with gravel (Rip Rap) outlet.

**PURPOSE:**

- Reduce velocities and peak discharge of storm water runoff.
- Create temporary ponding to allow settlement and deposition of suspended solids.
- Protect down-gradient discharge point from sediment laden runoff and eroding velocities.

**APPLICATION:**

- Temporary control for runoff from disturbed areas of less than 3 acres.
- Temporary control for discharge from diversion dike, surface benching, or other temporary drainage measures.

**LIMITATIONS:**

- Should be sized based on anticipated runoff, sediment loading and drainage area size.
- May require silt fence at outlet for entrapment of very fine silts and clays.

**INSTALLATION:**

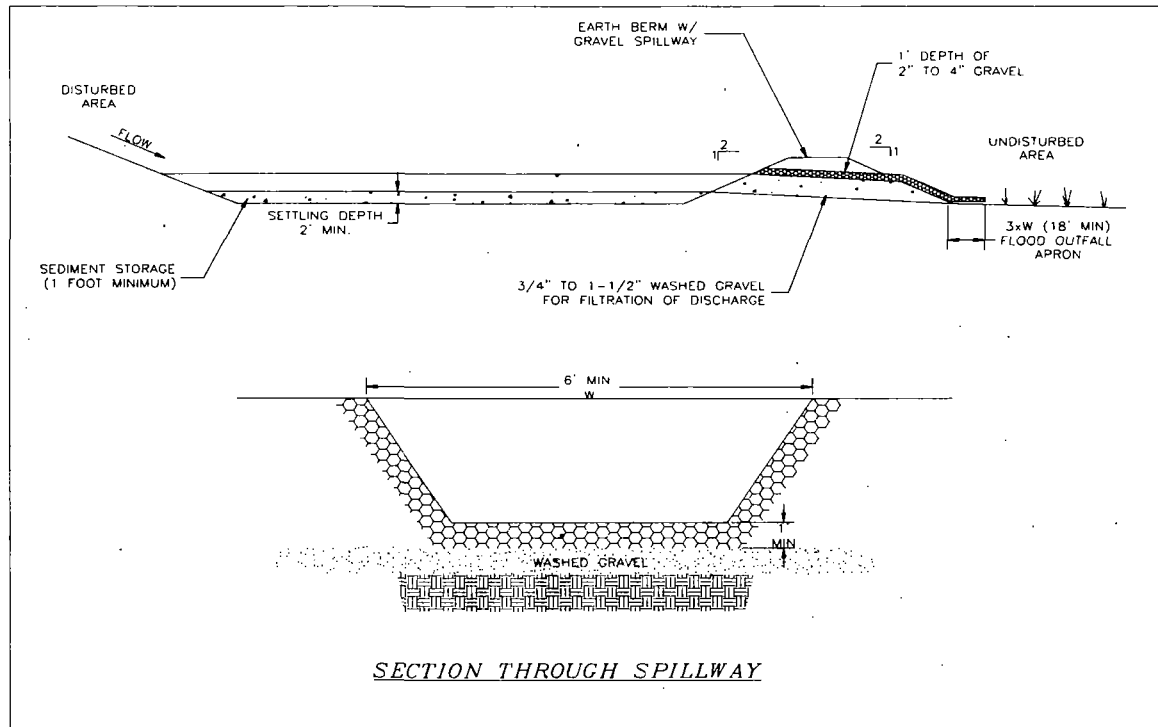
- Design basin for site specific location.
- Excavate basin or construct compacted berm containment.
- Construct outfall spillway with gravel (Rip Rap) apron.
- Provide downstream silt fence if necessary.
- Use straw bales in trap to reduce gullyng.

**MAINTENANCE:**

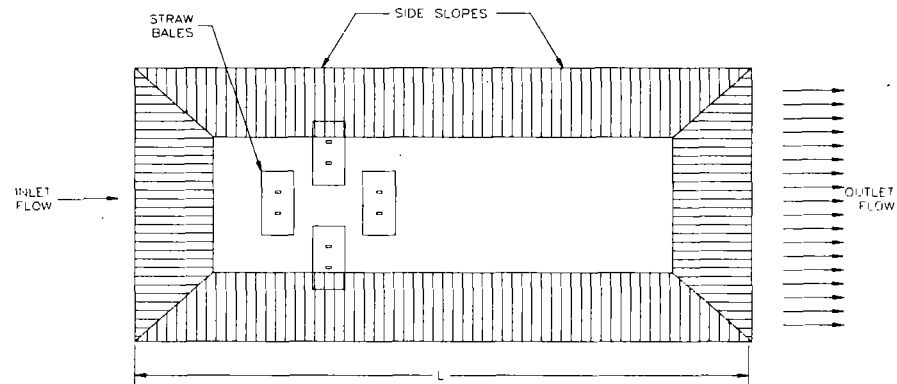
- Inspect after each rainfall event and at a minimum of monthly.
- Repair any damage to berm, spillway or sidewalls.
- Remove accumulated sediment as it reaches 50% height of available storage.
- Check outlet for sediment/erosion of down-gradient area and remediate as necessary. Install silt fence if sedimentation down stream is apparent.

## TEMPORARY EXCAVATED SEIMENT TRAP

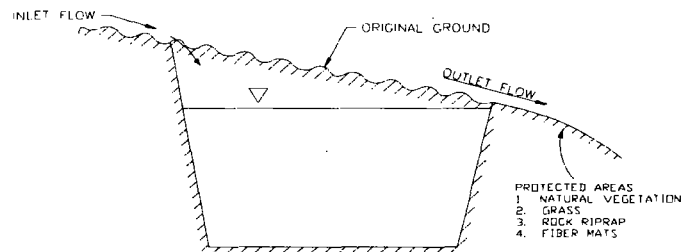
### TYPICAL DESING LAYOUT



*TEMPORARY EXCAVATED  
SIDEMENT TRAP  
TYPICAL DESIGN LAYOUT*



PLAN VIEW



SECTION A-A



## **EQUIPMENT AND VEHICLE WASH DOWN AREA**

**DEFINITION:** A stabilized pad of crushed stone for general washing of equipment and construction vehicles.

**PURPOSE:** To reduce potential of sediment being tracked onto roads and streets by vehicles leaving a construction site and entering a storm water collection systems, or waterways.

**APPLICATION:**

- At any site where regular washing of vehicles and equipment must occur to reduce the potential of sediment being tracked onto roads and streets by vehicles leaving a construction site.
- May also be used as a filling point for water trucks limiting erosion caused by overflow or spillage of water.

**LIMITATIONS:**

- Cannot be utilize for washing equipment or vehicles that may cause contamination of runoff such as fertilizer equipment or concrete equipment. Solely used to remove mud from vehicles leaving construction sites.
- A Sediment trap must be used in conjunction to control sediment runoff with wash water.

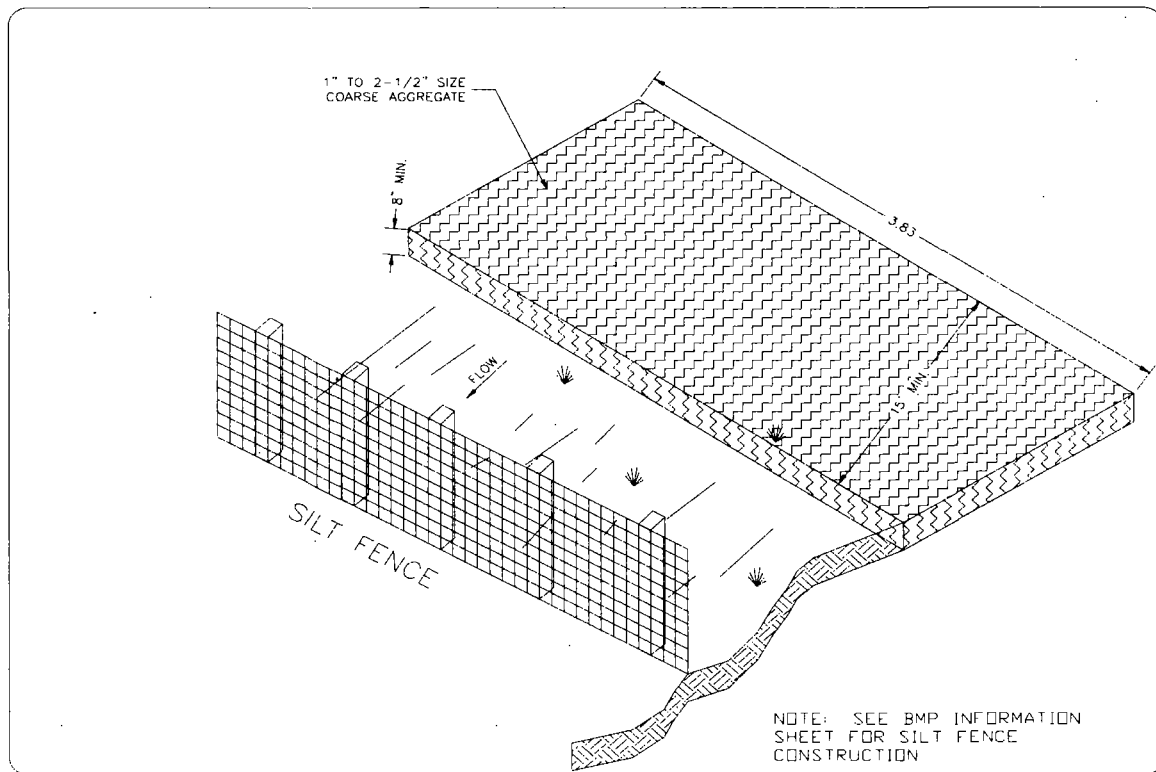
**INSTALLATION:**

- Clear and grub area and grade to provide maximum slope of 1%.
- Compact subgrade and place filter fabric if desired (required for wash areas which will remain in use for 3 months or more).
- Place coarse aggregate, 1 to 2 ½ inches in size, to a minimum depth of 8 inches.
- For small projects, instal silt fence down gradient (see silt fence BMP information sheet).
- For large projects, instal sediment basin down gradient (see excavated sediment trap BMP information sheet).

**MAINTENANCE:**

- Inspect daily for loss of gravel or sediment buildup.
- Inspect adjacent area for sediment deposit and install additional controls if necessary.
- Repair area and replace gravel as required to maintain control in good working condition.
- Expand stabilized area as required to accommodate activities.
- Maintain silt fence as outline in specific silt fence BMP information sheet.
- Maintain sediment trap as outline in specific sediment trap BMP information sheet.

*EQUIPMENT AND VEHICLE  
WASH DOWN AREA  
TYPICAL DESIGN LAYOUT*



## **MATERIAL STORAGE**

**DEFINITION:** Controlled storage of on-site materials.

**PURPOSE:** To limit potential for materials contaminating storm water runoff.

**APPLICATION:**

- Storage of hazardous, toxic, and all chemical substances.
- Any construction site with outside storage of materials.

**LIMITATIONS:**

- Does not prevent contamination due to mishandling of products.
- Spill Prevention and Response Plan still required.
- Only effective if materials are actively stored in a controlled location.

**INSTALLATION:**

- Designate a secured area with limited access as the storage location. Ensure no waterways or drainage paths are nearby.
- Construct compacted earthen berm or similar perimeter containment around storage location for impoundment in the case of spills.
- Ensure all on-site personnel utilize designated storage area. Do not store excessive amounts of material that will not be utilize on-site.
- For active use of materials away from the storage area ensure materials are not set directly on the ground and are covered when not in use. Protect storm drainage during use.

**MAINTENANCE:**

- Inspect daily and repair any damage to perimeter impoundment or security fencing.
- Check that materials are being correctly stored (i.e. standing upright, in labeled containers, tightly capped) and that no materials are being stored away from the designated location.

## MATERIAL STORAGE

### TYPICAL DESIGN LAYOUT

